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Apparatus for Catching Cinders in Gases

A Method Found Efficient by the
New York Edison Company—Regarded
Applicable to Blast Furnace Gas Cleaning

A new apparatus for cleaning the gaseous products of combustion, showing, it is stated, an average efficiency of no less than 95 per cent., has been developed by the New York Edison Company at its Waterside No. 2 station, on the East River, New York City. The apparatus is the result of some years of experiment, and so successful is it

cerning the system and the photographs from which the accompanying illustrations were made were obtained from C. B. Grady, of the New York Edison Company, who had much to do with the experimental work, and by whom a number of patents covering the system were originally taken out. The work was done under the charge of



TWO VIEWS IN THE CINDER CATCHER. The gases containing the particles of unconsumed carbon, dust and ash are turned downward at high velocity into a tank of water. The bottom of the smoke passage forms the tank. The gases are turned downward by a damper (the chain suspended plates in the picture at the left), the bottom of which forms one side of a slot-like opening with the side of the tank. The slot is the point of high velocity and on entering the tank the gases are sharply diverted. The opposite face of the damper to that shown in the picture is kept wet and the little waterfall from it, and through which the gases on entering from the slot have to pass is shown at the bottom of the picture. The piping shown is for washing out of the tank the material caught every 24 hours. The picture at the right shows the pipe supplying water to the wetted face of the damper and the mechanism for raising and lowering the damper according to the volume of gases handled.

with the immense volumes of gases which are treated—many times larger, for example, than the volume handled at a blast furnace plant—that it would seem to have an application of very wide scope. Accordingly, it is expected that it will be employed in the steel industry for the purification of blast furnace gas for use in gas engines and hot stoves, and in cement plants. The facts con-

Thomas E. Murray, vice-president of the New York Edison Company, who is responsible for the experiments, the equipment and the design.

The accompanying drawing is a cross-section of one of the boiler settings, showing the apparatus arranged in the main smoke flue. The steam boilers in the Waterside station are placed in rows, back to back, and the draw-

ing shows how the gases of combustion approach the apparatus from opposite directions. Some idea of the size of the installation may be gained when it is realized that the power station contains 96 steam boilers of 650-hp. rating, which boilers, however, are operated much above the normal rated capacity. The boilers are arranged on two floors, with 48 on each floor. The movable damper D in the drawing is about 5 ft. high and 50 ft. long, running the entire length of the flue. The water tank at the bottom of the flue is $8\frac{1}{2}$ ft. wide by 50 ft. long, and about 18 in. of water is maintained in the tank. Water is taken from the tank and pumped into the water pipe K by means of a small low-head centrifugal pump. The water flows out of the pipe K through a number of 1-in. holes, spaced about 4 in. center to center, into the gutter, G, then flows over the edge of the gutter G down the inside face of the damper D into the tank. About 75 gal. of water per minute per boiler are thus circulated, and about 8 gal. per minute per boiler are added to make up for the evaporation and for the water spray which is carried away by the gases. Salt water is used at the Water-side stations, the water being taken from the fire service.

The gases originally left each boiler at the rear through a horizontal intake A and traveled along a horizontal rectangular flue P to the stacks. There are four stacks all told, each 264 ft. in height above the second-floor boiler grates. The new arrangement with the cinder catchers is as follows: The gases leave the boiler through the same horizontal intake A and are deflected downward by a baffle plate C and then pass down through a wedge-shaped duct, one side of which is formed by the movable damper D and the other side by one of the sides of the flue. The above-mentioned duct is of uniformly decreasing cross-section and is open at the lower end, so that the direction of flow of the gases as they leave the duct is substantially vertical. In passing through the cinder catcher the gases are fanned out, so that they leave the bottom of the catcher through a narrow, long slot. The water level in the lower portion of the flue is kept constant and at a comparatively short distance from the bottom of the damper D. The water flowing into the gutter G and running over the edge of the gutter forms a sheet of water on the damper D which makes a little waterfall from the bottom of the damper D to the water in the bottom of the flue.

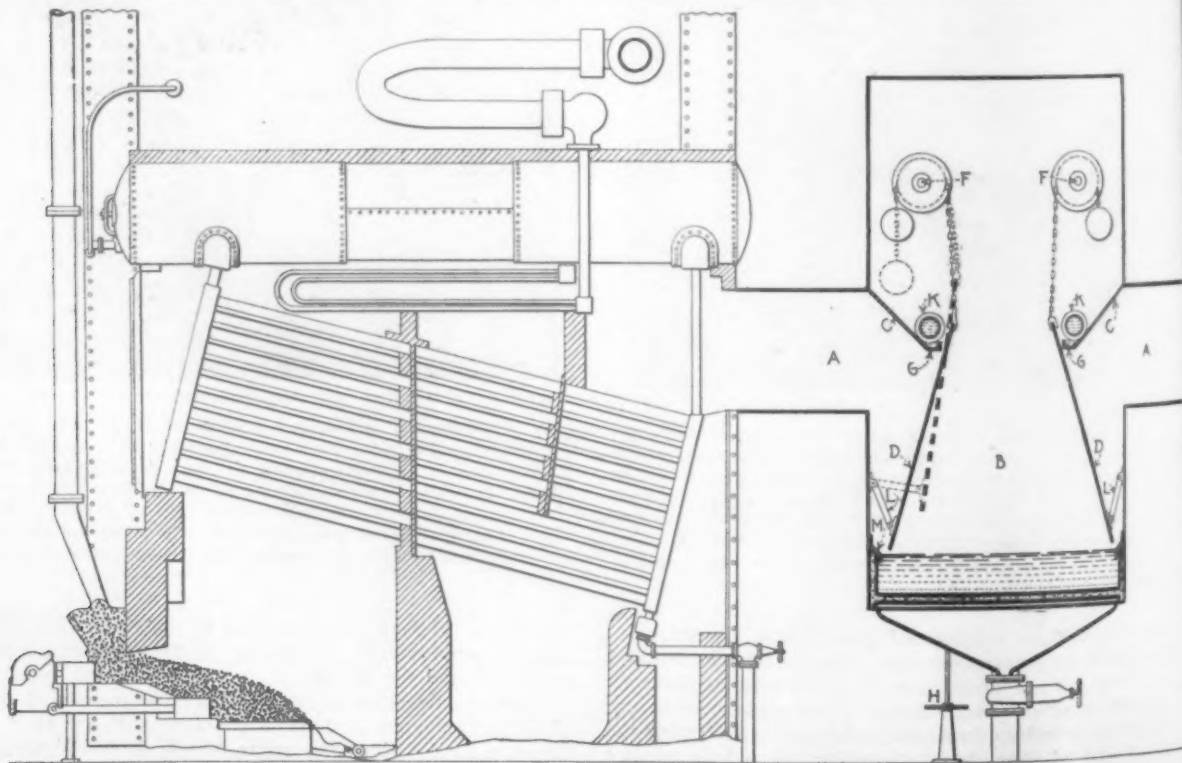
The cinders are caught either by coming in contact with the sheet of water on the damper D and thus being carried into the water below or are projected into the water in the bottom of the flue by the comparatively high velocity that they have attained. This velocity is attained

partly by the increase in the velocity of the gas current in which the cinders are suspended and partly by gravity. This is an important feature, for the inertia of the solid particles varies in proportion to the square of the velocity and the resistance of the projected particles to any force tending to change their direction of travel varies as the inertia. It is estimated that the cinders are projected toward the surface of the water with a velocity of about 50 ft. per second.

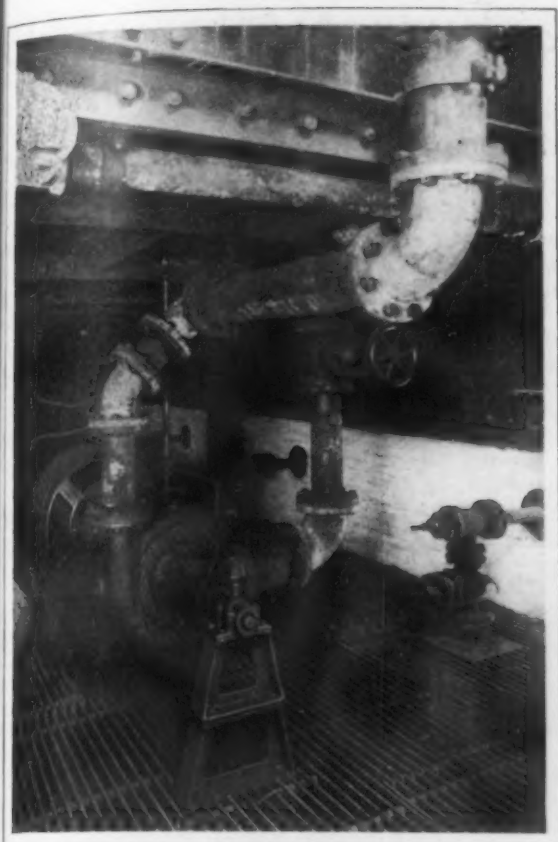
Two positions of the damper D are shown. The position showing the damper D in full lines is used when the boilers are operating at light loads and the position showing the damper in dotted lines is used when the boilers are operating at a maximum load. The dampers are raised and lowered by turning the shaft F which is operated from the boiler room floor by means of a hand wheel H. The lower portion of the movable damper D is connected to the side of the flue by means of a link L so that the bottom of the damper D will move upward and outwardly when the top of the damper is raised, and maintain the distance from the side of the flue to the bottom of the damper and the distance from the surface of the water to the bottom of the damper approximately equal.

The wet method of cleaning was not considered at the outset, but instead a number of experiments were made to avoid the use of water, which, it was thought, would be detrimental from a number of standpoints, and it should be added that the cinders, so called, include not only the dust and ash carried away from the fuel bed, but small particles of unconsumed carbon, all of which are drawn up the stack and blown into the atmosphere.

The first experimental wet-cleaning apparatus consisted of a curved baffle plate placed just beyond the boiler outfit, so as to deflect the gases in a downward direction and a water tank below to catch the cinders. This simple scheme caught quite a percentage of the solid matter carried by the gases, and the next step was to increase the distance traveled by the gases in a downward direction and also materially increase the velocity, so that the solid particles would be driven toward the water with a higher velocity and thus trap a larger percentage of cinders. The first experimental outfit of this type gave remarkably good results. The gases were conducted downwardly through a four-sided, wedge-shaped duct tapering toward the outlet, three sides of the duct being vertical and the other inclined, the water level in the tank being maintained about 12 inches from the bottom of the duct. At the same time another scheme for wet cleaning was being tried out. An inclined baffle was placed



Cross-Section Showing Cinder Catching Apparatus Arranged in Boiler Smoke Flue



Centrifugal Pump for Circulating the Water Used in the Catcher

in another flue and a sheet of water was maintained, flowing over the upper face of the baffle, so that the gases would tend to drive the solid particles against this sheet of water. The next move was to combine this idea with the former and let a sheet of water flow down along the inclined side of the duct into the watertank below, so that the gases in entering and going through the duct would drive a portion of the cinders into this sheet of water. Tests on this experimental device led to the apparatus now in use.

One of the first ideas considered in the study of the dust-elimination problems was to enlarge the smoke flues, so as to reduce the velocity of the gases, allowing the solid particles to settle to the bottom of the chamber. The velocity was reduced to less than one-half of the original, and about 40 per cent. of the cinders were caught. Later baffles were introduced, perpendicular to the direction of flow of the gases, and only a slightly increased percentage of cinders was caught, and in addition there was interference with the draft. It was then thought that perhaps economizers, in which the tubes are staggered, would result in intercepting cinders, and 24 of the boilers were equipped with economizers, but the installation did not remove a large quantity of the suspended solids, and as there was also interference of draft in this case the economizers were removed. Another method tried was that of passing the gases through filtering material, a wire screen being used at the bottom of one of the stacks. The screen was given a reciprocating motion, and a part of it remained inside of the uptake while the other part was outside, and the outside part was cleaned by means of brushes. A number of different sizes of screens was tried, but when a screen was fine enough to catch 50 per cent. of the cinders it interfered too much with the draft and the cleaning of the screen was difficult. The idea of employing centrifugal force for removing cinders was tried, the scheme being to impart a whirling motion to the gases, throwing the cinders out into pockets. Tests on experimental cleaners of this type were not satisfactory, nor was a combination of the enlarged flue and the centrifugal filter altogether satisfactory. Apparatus was also installed to precipitate the particles according to the Cottrell electrification method, but there was difficulty in connection with the insulation under the high potentials employed.

The adopted form of cinder catcher, Mr. Grady says,

does not materially reduce the boiler capacity. With a draft at the stack base of from 0.9 to 1.2 in. of water a load of 1500 hp. can be carried on each 650-hp. boiler with only a slight decrease in the efficiency of the cinder catcher. The position of the baffle is always maintained at such a point that the gas velocity leaving the baffle is the highest possible with the stack draft obtainable; thus under normal draft conditions with boilers operating at 110 per cent. and 150 per cent. of rating the baffle opening would be from 3 to 6 in., while for 225 per cent. of the boiler rating the opening would be increased to 14 in.

The gases coming from the boilers at the Waterside stations contain about 0.06 per cent. of sulphur dioxide gases, and a certain amount of sulphurous acid is formed by the flue gases coming in contact with water. The gases as they leave the cinder catcher carry with them a certain amount of entrained water which is slightly acid, and the water in the tank after a run of 24 hr. is found to contain 0.025 per cent. of sulphurous and sulphuric acid—a small percentage of the sulphurous acid probably having been changed to sulphuric acid by the absorption of another atom of oxygen. The presence of the sulphurous and sulphuric acids and also of a small amount of hydrochloric acid, formed by the combination of the sulphuric acid and the salt in the water used, has given considerable trouble, due to the fact that ordinary iron and other metals which have been used for the damper D have been rapidly eaten away.

The baffle plate C and the movable damper D in the first experimental cinder catcher were made of sheet iron. After a two weeks' run this material showed signs of rapid deterioration. A number of other materials have been tried and copper is now being used for both baffle plate and damper. The dampers are of No. 8 gauge copper, flanged and bolted together with $\frac{3}{8}$ -in. copper bolts, the ends being reinforced with a $2\frac{1}{2}$ -in. copper bar. The copper, Mr. Grady finds, is withstanding the acid action better than anything else which has been tried. The inside face of the damper D on which the water runs shows practically no deterioration after two months' use, but the outside face of the damper has been slightly attacked. Experiments are being made on a number of acid proof and heat-resisting coatings to protect the outside face.

The flues at the Waterside stations are composed of $\frac{3}{8}$ -in. steel plate reinforced with angle irons and are painted inside and out with two coats of red lead and linseed oil paint. A lead lining has been placed at the bottom of the flue forming the water tank. The lead is about $\frac{1}{8}$ in. thick and a concrete mattress about $1\frac{1}{2}$ in. thick is placed between the steel plate of the flue and the lead lining. The upper portion of this lead lining is protected from the heat by a copper flashing M. No other protection has been given to the inside of the flue. The first cinder catcher was placed in operation about four months ago and the lead lining and all inside surfaces of the flue proper have shown practically no signs of deterioration.

As stated, Mr. Grady claims on the basis of a number of tests an average efficiency of 95 per cent. in cleaning the cinders. This, he has figured, is equivalent to cleaning the gases down to 0.02 grain per cubic foot, a figure comparing favorably with results obtained with scrubbers and washers used in blast furnace gas-cleaning plants. From the nature of the apparatus and the results obtained it is felt that it is applicable for use in steel and cement mills, and that in some form it may be applied to steam locomotives where fire from sparks has been a loss to properties bordering on railroads.

With regard to the illustrations, it may be pointed out that one shows a general view of the cinder catcher, in which water may be seen flowing from the lower portion of the movable damper into the water tank below, the gases as they leave the cinder catcher passing through this water fall. The pipes in the foreground are used for washing out the cinders in the water tank, which is done every 24 hr. Another illustration gives a view of the upper portion of the cinder catcher and the mechanism for raising and lowering the movable damper. Water is shown flowing out of the cast-iron pipe, located just above the top of the movable damper into the copper gutter, which is behind the upper portion of the damper. The third half-tone illustration shows the centrifugal pump used for circulating the water, this particular installation serving six of the 650-hp. boilers.

The Two New Tilting Furnaces at Buffalo

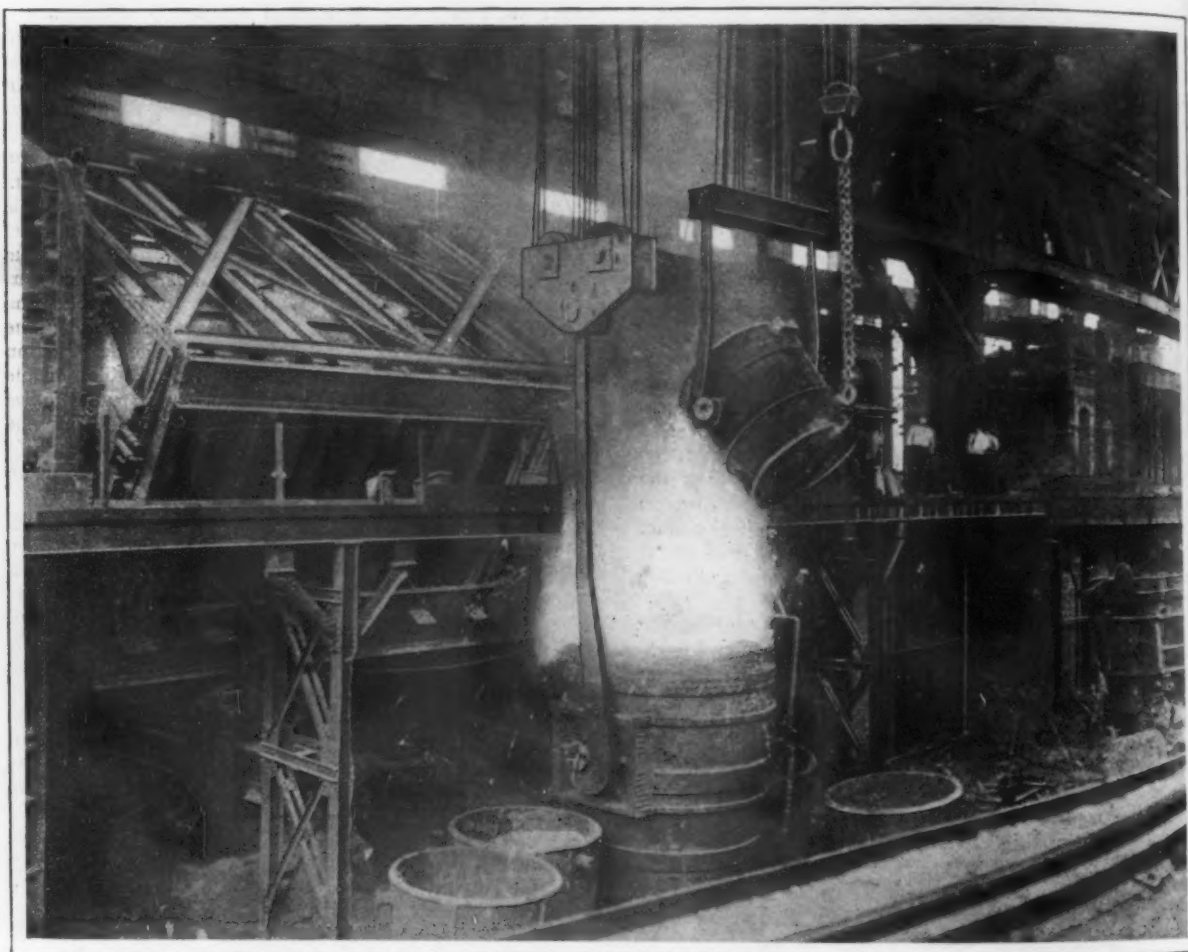
The Late Additions to the Open-Hearth Plant of the Lackawanna Steel Company—Arrangement for Duplex Process—Record Outputs

At the Buffalo plant of the Lackawanna Steel Company two tilting furnaces have recently been completed and placed in operation. They form part of the No. 2 open-hearth plant, which, when completed, will comprise the two tilting furnaces and eight large stationary furnaces, four of the latter being now in process of construction. The tilting furnaces, which were built from designs developed by the Lackawanna Steel Company, have shown most gratifying results in operation, both as to output and quality of steel, and have a number of interesting features of construction.

The new plant is located directly north of the Bessemer

weigh about 115 tons each. The buildings for this plant were designed by the company and fabricated in its own shops.

The accompanying cross-section drawing of the plant shows the ample proportions and the relation of furnace and equipment. The general plan of the plant shows the relation of the tilting furnaces to the Bessemer plant. The charging floor is served by a 75-ton crane of 55 ft. 10 in. span having an auxiliary trolley of 25-ton capacity, while the pouring side of furnace is served by two 165-ton cranes of 58 ft. 8 in. span having auxiliary trolleys of 35-ton capacity. An interesting feature of these large



Tilting Furnace During Tapping and Recarburizing Operation

steel works, this location being adopted after careful consideration of the available sites as being well situated with reference to the mills using the steel, and at the same time permitting advantage to be taken of the equipment of the Bessemer plant for operating the duplex process with the two tilting furnaces. This arrangement makes a comparatively short haul for the hot metal between the converters and the furnaces.

The construction of the new plant is of a most substantial character. Extremely heavy construction has been used in both the building and machinery, the object being to insure as far as possible against delays or shut downs through the breakage of machinery. The two tilting furnaces are located in an all steel construction building 352 ft. long by 124 ft. wide. On account of the great length of the tilting furnaces, and their location on the line of the center columns, the heavy construction is particularly noticeable in the case of the crane runway girders. These girders have a span of 110 ft., are 12 ft. in depth and

cranes is the 5-ton auxiliary hoist on the 35-ton trolley, which is used for tilting the spiegel ladle during the recarburizing operation. The charging machine is of the high type and was furnished, together with the cranes, by the Morgan Engineering Company, Alliance, Ohio. The furnaces are charged with cold material by the charging machine in the usual manner, this material being chiefly burnt lime, mill scale and spout skulls.

The charging floor has in addition to the tracks for the charging machine and the stock track next to the furnaces, a third track along the west side of floor, to be used for handling hot metal from the mixers to the stationary furnaces in ladle cars. Two additional tracks are located on a platform outside of building for handling and switching stock for the stationary furnaces and such as is required for the tilting furnaces. A stock yard 650 ft. long served by two 10-ton Morgan cranes of 100 ft. span, is located to the west of the new plant where all cold material for both the tilting and stationary furnaces will be loaded into

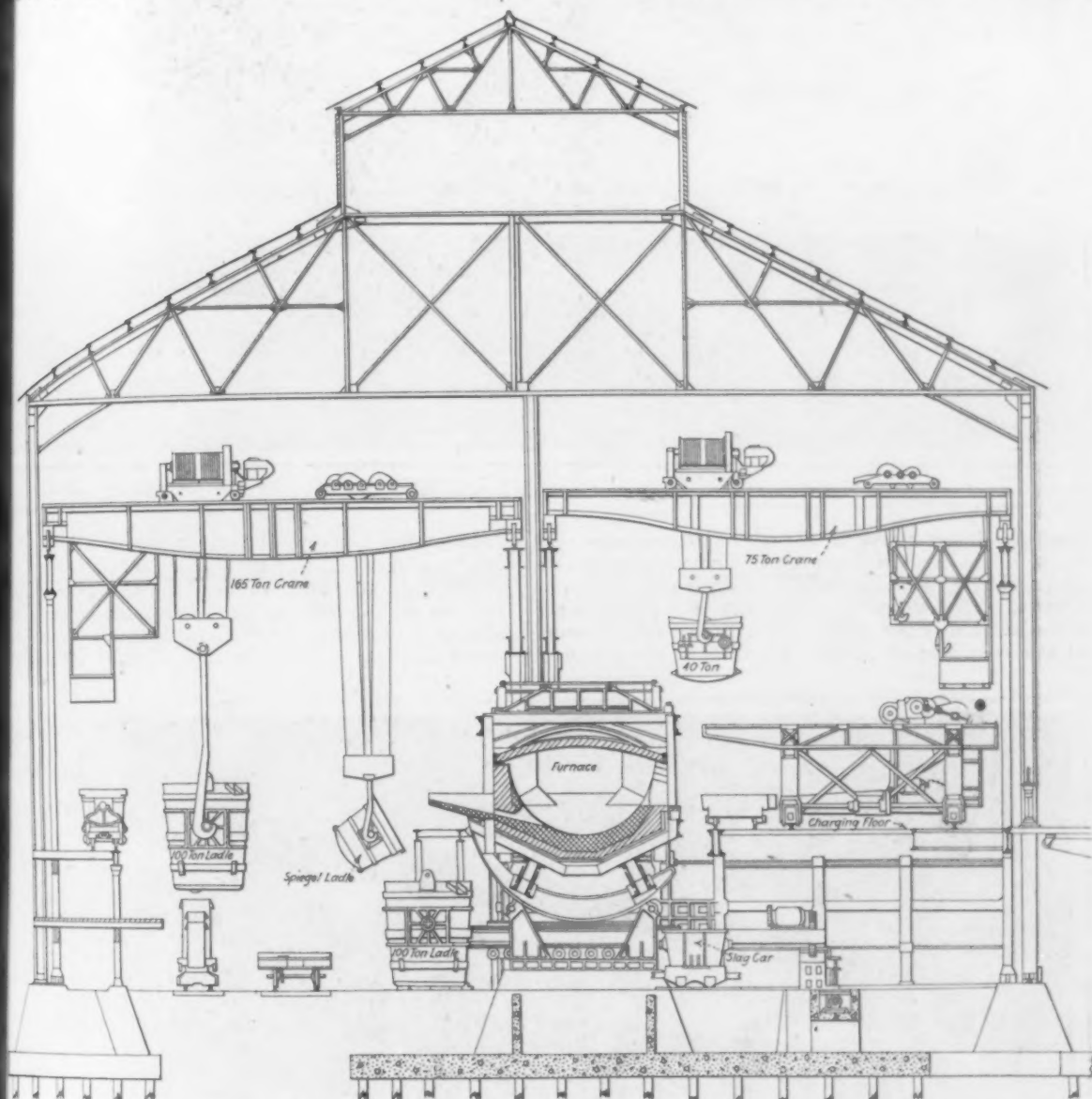
placed on the charging cars. The tracks for charging cars in the stock yard are at yard level and the cars are raised up a trestle to the charging floor by an 18 x 24-in. wheel H. K. Porter locomotive. On the pouring side the furnaces an ingot mold track extends the full length of the plant, also a standard-gauge track. Along the east wall of the open hearth building and above the pouring platform is located the spiegel track.

In the operation of the duplex process with these furnaces, hot metal is delivered direct from the blast furnaces to the mixers at the Bessemer plant, of which there are two of 250 and 300 tons capacity, respectively. This iron

forming a charge, varies, but four is the usual number.

In case it is found necessary to add mixer metal to these furnaces, provision is made for pouring metal from the mixers into a motor-driven transfer car of the same type as used for blown metal. This car is moved to the south end of the open-hearth plant, and the ladle is handled by the 75-ton crane to the furnace in the same manner as with the blown metal. This method of handling hot metal from the Bessemer plant is necessary on account of the existing levels of the converters and mixers which pour at a lower level than the open hearth charging floor.

When the furnace is ready to be tapped, it is tilted and



Section Through Open-Hearth Plant, No. 2, Lackawanna Steel Company, Showing Tilting Furnaces

has an average phosphorous content of average basic iron, and is blown in the usual way either full or in part as desired. The converter equipment consists of four 12½-ton converters, two of which are ordinarily used in connection with the tilting furnaces.

The blown metal is poured from the converters into ladles set upon jib cranes and from this ladle is poured through a large nozzle into a ladle on a transfer car. In this way no Bessemer slag accompanies the metal going to the open-hearth furnaces. The transfer cars are motor driven and have ladles of 25 tons capacity, taking two heats from the converters, the two together averaging about 25 tons. These transfer cars, which operate on the ground level, are then run to the south end of open hearth plant where the 75-ton crane raises the ladle of hot metal to the charging floor level, and delivers it to the furnace to be charged where it is poured into the furnace through a portable spout placed in position at one of the furnace doors by the charging machine. The number of ladles

a heat of 95 to 100-tons of steel is poured into the ladle, which is suspended from the hooks of the 165-ton crane. The spiegel for recarburizing is brought from the cupolas in the Bessemer plant in 18-ton ladle cars and added to the steel in the ladle while the furnace is being tapped. One of the half-tone illustrations shows the operation of adding spiegel to the steel. After the furnace has been tapped, it is tilted back and the slag line taken care of, if found necessary, and the cycle repeated. These tilting furnaces operating on all hot metal are each producing steel at a rate of over 20,000 tons per month; No. 15 Furnace, which was the first one placed in use, making over 22,000 tons in July.

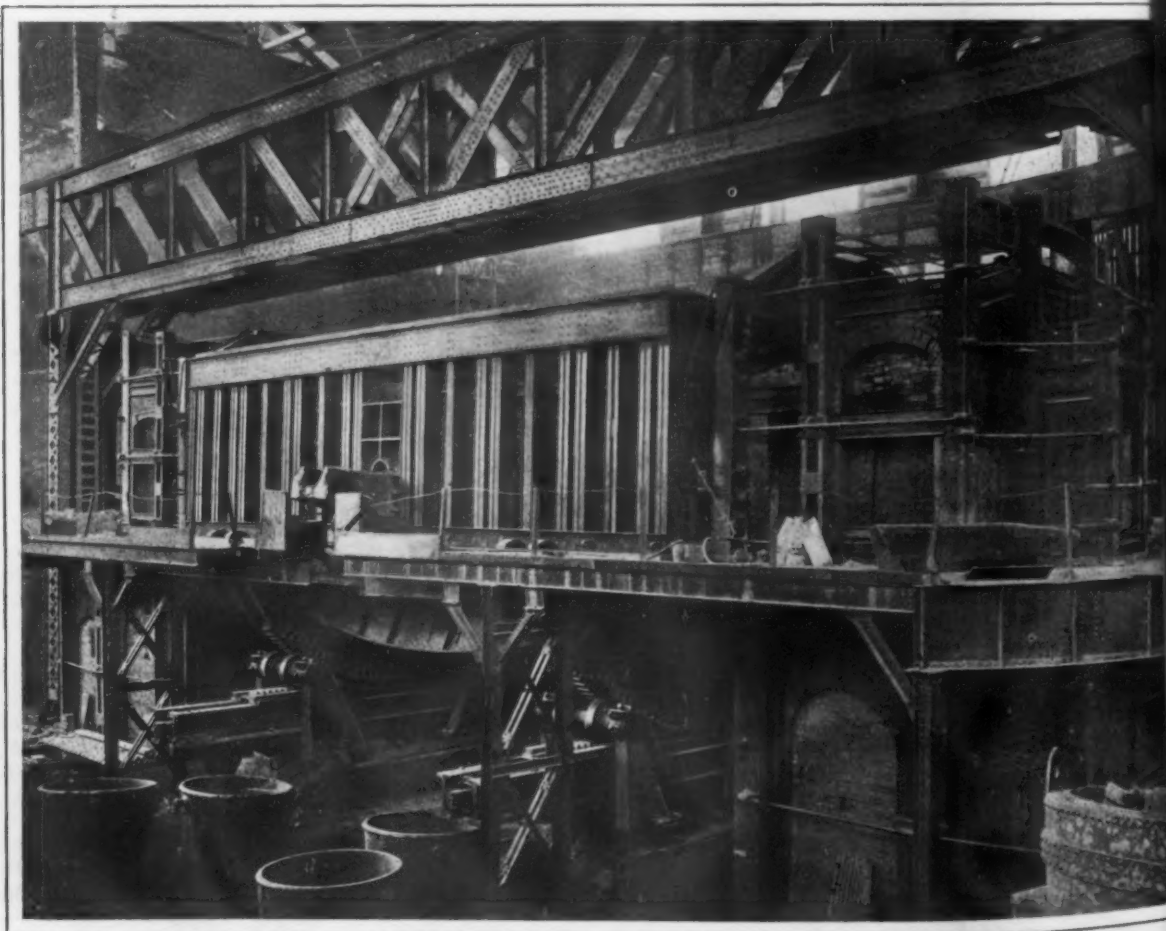
In the construction of the furnaces themselves, there are many interesting features being, in common with the rest of the plant of the most massive construction. The framework of the furnace proper consists of heavy beams and channels suitably tied together and braced. The frame work rests upon two heavy box girders, extending



Charging Side of the Tilting Furnaces

from one rocker casting to the other. These rockers are set 30 ft. 6 in. on centers and rest on heavy I-beam girders, which support the entire weight of the tilting portion of furnace. These girders also form a part of the tilting mechanism, and are supported on a series of steel rollers mounted in a massive base casting. The tilting of the furnace is

accomplished by means of a rack bolted on the I-beam girders, meshing with a gear segment bolted to the rocker castings and actuated by means of a steel screw journal between the I-beams and held by self-aligning thrust bearings of the ball type, so that no lengthwise motion of the screw can take place. The screws which are cross-co



Pouring Side of the Tilting Furnaces

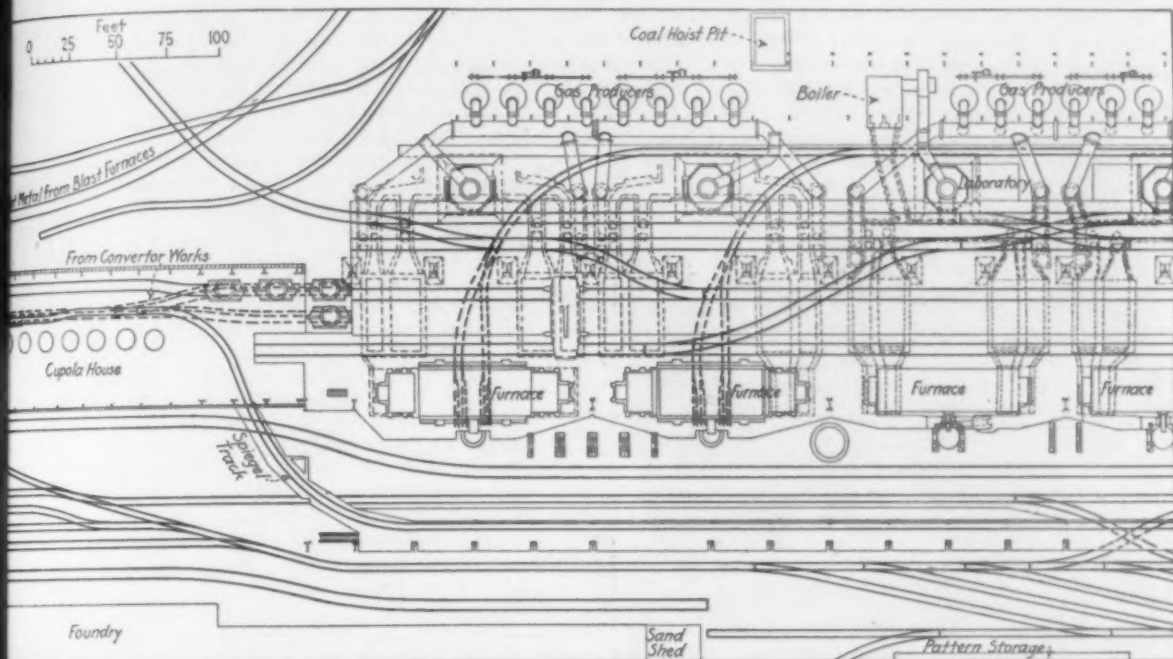
ected by shafting below the floor level to avoid twisting stresses in the structure, are each driven by a 50 hp. motor and tilt the furnace in either direction.

The furnace has a hearth 13 ft. wide by 40 ft. long and 50 ft. long over the chill plates. On the charging side there are seven doors. A door 2 ft. 6 in. x 2 ft. 11 in. is located at the center of furnace, and on either side are two doors 3 ft. x 3 ft. 6 in. and a smaller door near the ports 2 ft. x 2 ft. 4 in. The center line of the ports has been made the center of rotation of the furnace, which results in the stationary ports and those in the furnace itself always maintaining their proper relation to each other, irrespective of the position of the furnace, and cold air is prevented from impinging on the ports. Great care has been taken in the construction of the ports so that when the furnace is heated up there is a minimum of

Coming Congress on Safety in New York

The second safety congress is scheduled to be held September 22 to 25, inclusive, at the Hotel McAlpin, New York City. The first was in Milwaukee, in the fall of 1912, and the proceedings have required a book of 336 pages. It was held under the auspices of the Association of Iron and Steel Electrical Engineers. Information regarding the second congress may be obtained from L. R. Palmer, 2135 Green street, Harrisburg, Pa., secretary of the National Council for Industrial Safety.

Among members of the advisory board of the council are the following: O. P. Briggs, president National Founders' Association; W. H. Cameron, manager casualty department American Steel Foundries; C. L. Close, manager bureau of safety, relief, sanitation and welfare, United States



Plan of Open-Hearth Plant No. 2, Lackawanna Steel Company, Showing Tilting Furnaces

clearance between the stationary ports and those in the furnace, greatly reducing the amount of cold air introduced into the furnace. The furnaces are equipped with Blair ports. The regenerator chambers are of ample proportions and the binding is unusually heavy and well tied together. The checker volume for one end of furnace is 388 and 3084 cu. ft. for air and gas checkers respectively.

Each furnace is served by a self-supporting steel stack 100 ft. high having a diameter inside of lining of 7 ft. The gas and air reversing valves are of the water cooled and water sealed type, designed by the Lackawanna Steel Company, and used on all its open hearth furnaces. The valves are 36 in. in diameter for the gas and 48 in. in diameter for the air.

Gas producers furnish the fuel for the furnaces, and the plant is located 66 ft. west of the furnace building and parallel to it. It is housed in a steel building 153 ft. long by 24 ft. span. Four Hughes self-cleaning mechanical producers are provided for each furnace. The gas mains are located outside of the producer house and the cross-over mains to the furnaces are carried overhead and are provided with dust pockets. The arrangement for supplying fuel to the producers consists of a continuous steel overhead bunker from which the coal flows by gravity to the hoppers on the producers. Coal is discharged from cars into a track hopper and after passing through a roll crusher is elevated by a bucket elevator and distributed to any part of the overhead bunker by a 24-in. belt conveyor.

Of descriptions which have appeared in these columns relating to the Lackawanna Steel Works may be mentioned the following: General description of the original plant January 7, 1904; the gas producer plant, December 29, 1904; the No. 7 blast furnace, February 21, 1907, and the new merchant mill, September 28, 1911.

Steel Corporation; J. W. Coon, chairman general safety committee Baltimore & Ohio Railroad; G. G. Crawford, president Tennessee Coal & Iron Railroad Company; Marcus A. Dow, general safety agent New York Central Lines; Elbert H. Gary, president American Iron & Steel Institute; J. D. M. Hamilton, claims attorney Atchison, Topeka & Santa Fé Railroad; Dr. Joseph A. Holmes, director United States Bureau of Mines; J. Kirby, Dayton Mfg. Company; J. Kruttschnitt, chairman executive committee Southern Pacific Railroad; Thomas Lynch, president H. C. Frick Coke Company; M. W. Mix, president Dodge Mfg. Company; Arthur T. Morey, assistant to president Commonwealth Steel Company; S. J. Peterson, acting safety agent Union Pacific Railroad; G. A. Ranney, International Harvester Company; R. C. Richards, chairman central safety committee Chicago & Northwestern Railroad; Henry D. Sharpe, president Browne & Sharpe Mfg. Company; W. B. Spaulding, chairman central safety committee Frisco Lines; Dr. W. H. Tolman, director American Museum of Safety; R. J. Young, manager safety department Illinois Steel Company.

A new building material, known as Tekton, which is being introduced by Ollendorff & Clarkson, Ltd., Glasgow, is stated by the London Times to be of the nature of artificial wood and to possess the strength and durability of concrete. The ingredients are magnesite, granulated slag, chloride of magnesium, and "wood flour," and its principal properties are that it is porous, has a low heat conductivity, and is sound-proof, fire resisting, odorless, and not liable to develop dry rot. It is made in boards and planks, or may be modeled in any required shape. The Zeppelin Airship Company has made a five years' contract for Tekton for the construction of all its hangars.

"Crystallization of Steel Through Fatigue"

A Criticism of This Generally Accepted Idea—Fractures Due to Stress Not Necessarily Crystalline—A Practical Example

—BY F. ROGERS—

For many decades it has been usual to describe a piece of wrought iron or steel which breaks in service with a bright crystalline fracture as having "become crystallized through fatigue." This diagnosis, especially in the case of iron, occurs quite as frequently nowadays as before the advance of metallography. Evidently upon its soundness rests largely the allocation of the responsibility for many failures, as between the maker of the iron, who in some cases at least knows that the explanation is incorrect, and the user, who should now be aware that there are ready means of systematic inquiry into such failures.

Even among well-known writers such phrases occur as "evidently crystallized through fatigue," and "there is now

knowledge of the mechanism of strain effects, particularly since it is not proposed to offer any important novel material from this point of view, but it will be recalled that there are four well-recognized principal types of effects: 1. Slipbands. 2. Intergranular weakness. 3. Twinning, which Neumann lamellae may tentatively be taken to be a special case. 4. Change of structure.

Of these the first is by far the commonest, and is almost universal. I have found that typical fractures due to repeated slip under alternating stress in iron and steel are not of markedly crystalline appearance. The portion which finally suddenly breaks, if any, may have a "crystalline" fracture, but any other portion of the same sample broken by nicking and a blow has a similarly crystalline fracture showing that the alternating stress has not produced a crystalline-breaking structure.

The second can give rise to a fracture of highly crystalline appearance. There is, however, no evidence that fatigue can give rise to crystalline-like intergranular fractures in a material which would not when quite new, broken, by a single straining, break in the same manner.

The third, twinning, excluding Neumann lamellae, occurs to an unimportant extent in iron and steel of commerce; further the ability to form twin crystallization in my experience found to be associated with great ductility rather than with brittleness. I have never been able to ascribe brittleness to this cause. The precise nature of Neumann lamellae is problematical. For example, an incipient fatigue fracture which I regarded as caused by repeated slipping of an ordinary slip-band was considered by the late Mr. Osmond to be a Neumann lamella. So as my observation goes, a fracture through a Neumann lamella is not essentially of a crystalline appearance. Speaking broadly, however, it may be said that crystalline-like fractures may be expected in ferrite-containing materials which show Neumann lamellae under dynamic stress. Here again fatigue does not necessarily enter into the production of a crystalline fracture.

The fourth of the effects, change of structure, has often been proved to occur in polyhedric nickel and manganese steels whose composition is near the border between martensitic and polyhedric structure, and is evidently not a typical case in point.

During the past dozen years I have examined many samples in the hope of finding evidence on this point, and have come to the uniform conclusion that if a piece broken in service with a crystalline-looking fracture it would also have done so when new, and will also give similar crystalline fractures in parts which have not been materially fatigued, and where the material is of the same kind as that near the service fracture. Further, it is my experience that fatigue will not cause crystalline fractures in a material which initially gives fibrous or silky fracture. Very sudden shock may, however, give rise to a rather more crystalline appearance of the fracture of some metals.

A Practical Example

The partly "crystalline" and partly fibrous fracture produced in Fig. 1 is of a type which is usually at once ascribed to "crystallization through fatigue." The piece which failed in use, was a wrought-iron center post, around which rotated a heavily loaded overhanging arm. An examination readily proved that the crystalline appearance of the fracture could not have been due to the fatigue which caused the failure. Some of the following particulars are also relevant in other respects.

When broken elsewhere the fractures were, throughout the length of the post, of the same type, and contained crystalline and fibrous portions at positions corresponding exactly with those in the fatigue fracture. This shows that the piece had been built up of two or more distinct

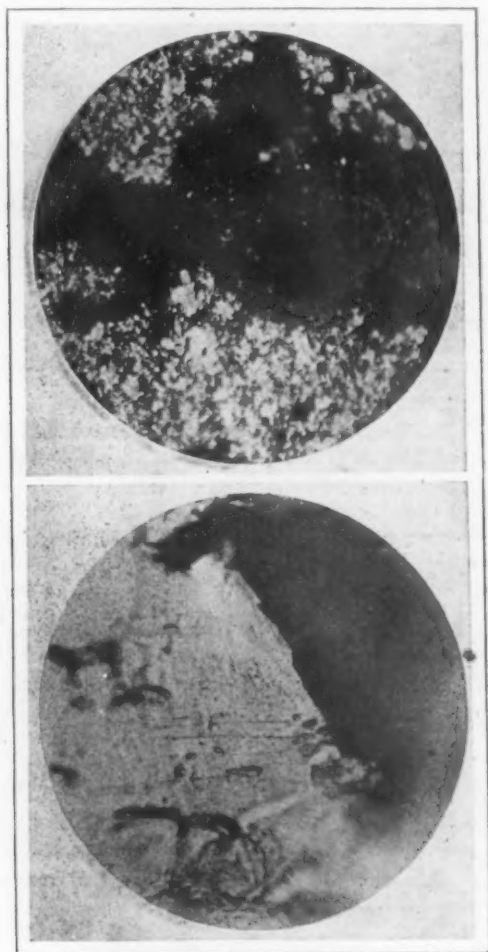


Fig. 1—Fracture of Defective Iron Post. Four Diameters. Fig. 2—Edge of Fracture in Defective Iron. Photomicrograph Reduced One-Third from 250 Diameters

ample evidence that fatigue has caused them to become crystallized and therefore brittle." In no case, however, have I found any evidence in such papers that fatigue—that is, the effect of repeated stress in any form—had caused the metal to crystallize, or rather, to become more perfectly or coarsely crystalline, or that repeated stress had caused any alteration of the structure other than directly destructive effects.

Types of Breaking Effects

It is not proposed to enter very deeply into existing

*A paper presented at the Brussels meeting of the Iron and Steel Institute, September 1 to 4, 1913.

different varieties of metal. Examination of microscopic plates confirmed this. Corresponding to the crystalline structures, coarse grains predominated, and the part which was with a fibrous fracture consisted of comparatively small grains. Such an observation is not novel; but is not intended to imply that coarse-grained metal is necessarily brittle, or fine-grained metal necessarily tough. The amount of these large grains was from ten to twenty times as great as that of the largest grains in best Yorkshire iron, which has an all-fibrous fracture.

The amount of slag was relatively less in the coarse part than in the fine-grained part, but it was all iron slag throughout, thus disposing of any suggestion that this piece was a mixture of iron and steel. Neither cold work nor heating to 900 deg. C. removed the relative brittleness of the coarse portion, nor refined the microstructure, nor seemed it to give fibrous fractures.

Upon fracturing, by a blow, a piece after polishing, it was seen that the effect typical of the brittleness of the coarse crystalline part was a breaking straight across the grain, such as is shown in Fig. 2. This sharp edge lies at about the middle of the large grain in which it occurs, and is about parallel to the direction of the very slightly apparent slip-bands in the same grain. It is the edge of one of the brilliant facets which give the crystalline appearance of the fracture at this place. I found no instance of Neumann lamellae, or of intergranular weakness. Analysis gave the following figures:

	Carbon, per cent.	Sulphur, per cent.	Phosphorus, per cent.
Portion with crystalline fractures...	0.05	0.02	0.10
Portion with fibrous fractures....	0.05	0.01	0.22

These figures offer no tangible explanation of the cause of the difference between the two portions.

A piece of the defective post was submitted to test in the author's shock-testing machine, reproducing on a small scale the usual falling-weight test upon an axle. This is obtained by supporting the unnotched sample at both ends and giving it one suitable blow at the center from a falling weight, then reversing the piece and giving two blows, then reversing and again giving two blows, and so on. The sample was tested with a crystalline portion downwards, as was to be in tension at the first blow. The crystalline part cracked through at the first blow. Upon reversing, the sample broke in two pieces at the next blow.

Tests on Yorkshire Iron

For comparison, some similar samples of best Yorkshire iron were similarly tested; they gave practically constant deflections per blow, and showed no sign of failure after seven blows, when the test was discontinued. Upon nicking and breaking at the center, or at any point, these gave perfectly fibrous fractures, despite the severe straining caused by the test.

When best Yorkshire iron is tested under less severe alternating stress than this, one does not expect it to break with a fracture of crystalline appearance, whether it breaks under test or is subsequently broken for examination at the most severely stressed section. This was further verified by the author's rotating cantilever machine (Wöhler type), in which a piece of best Yorkshire iron was submitted, without failure, to 10,000 reversals of a stress of 7 tons per sq. in. at a speed of 1200 reversals per minute. When subsequently nicked and broken, the fracture at the most severely stressed section was still perfectly fibrous, as before.

Conclusions

Summarizing, it is clear that the coarse crystallization of the defective iron could not have been caused by the fatigue which caused its failure. The original bar was made up of fairly good and very bad irons. The precise reason why the bad iron was bad is not positively indicated in the best results given, but they suggest defective manipulation of the bad portions previous to piling with the good portions. Annealing did not cure the so-called "crystallization produced by fatigue."

In another instance I have readily traced the cause of a crystalline-looking fracture of iron, accompanied by brittleness, to the presence of some steel in the iron. This steel would doubtless enter in the form of scrap. The admixture of steel scrap with iron is admitted to be a hopelessly bad practice, even by iron manufacturers.

Osmium-Platinum, a New Alloy

In a paper presented before the 24th general meeting of the American Electrochemical Society, at Denver, Colorado, this week, F. Zimmerman discusses his invention of a new alloy to replace the important platinum-iridium so extensively used in metallurgical and pyrometrical work. He says:

"Of the several metals of the platinum group, platinum, palladium, iridium and rhodium have been most generally employed in the industrial arts, either alone or in combination as bivalent alloys. Of the latter, iridium-platinum is the best known, but the growing scarcity of iridium has led to the search for other combinations of the metals of this group yielding alloys possessing physical and chemical properties of equal if not greater value. The rarer metals of the platinum group are not easily obtained in great purity, and because of this fact but little success has heretofore been obtained when combining them as bivalent alloys. Furthermore, the strong affinity of osmium for oxygen has increased the difficulty of making alloys of it with other metals in definite proportions. After much experimentation by the author, highly refined platinum and osmium have been successfully combined in widely varying proportions yielding alloys of commercial value. While the two metals may be combined in almost any proportion, alloys containing from 1 to 10 per cent. of osmium and 99 to 90 per cent. of platinum are chiefly used.

"Great purity of the components is essential, as the presence of small percentages of other elements appears to be very detrimental to the properties of the resulting alloy. According to the chemical and physical behavior, it seems that one part of osmium in an alloy with platinum will take the place of two and one-half times its weight of iridium. The osmium-platinum alloy is very acid-resisting, and for this reason may be of great service in the electrochemical industry. Its electrical resistance is considerably higher than that of an iridium-platinum alloy of the same percentage composition. The alloy further possesses great hardness and tensile strength. Wires of the finest size are drawn with comparative ease."

Safety Measures at Raritan Copper Works

The Raritan Copper Works, refiner of copper, Perth Amboy, N. J., through addresses and entertainment at a local theater building on the evening of September 3, started a movement to engender enthusiasm among its employees, of whom 350 were present, in supporting a plan intended to reduce the number of accidents in the plant to the lowest point possible. The programme was under the direction of Superintendent A. C. Clark. Talks on accident prevention were made by L. H. Burnett and Robert Dixon, of the Carnegie Steel Company, and by Dr. William E. Ramsay, surgeon of the Raritan Copper Works. Through the courtesy of the safety committee of the United States Steel Corporation, moving pictures were shown describing "An American in the Making" and "A Workman's Lesson." The programme was further enlivened with singing by a quartette.

Superintendent Clark made an address giving the details of a plan designed for the cultivation of safety methods, patterned after the system now in use by the Carnegie Steel Company. He named a general committee of five members composed of heads of different departments and another committee of seven composed of men no higher in rank than foremen. The members of the latter committee are to make regular trips about the plant every week and recommend to the general committee any improvement looking to the more effectual establishment of safety. The committee of seven will be changed every three months, giving a large number of the employees an opportunity to serve on the board. The general committee will not only act on the recommendations of the working committee, but will also investigate all accidents occurring in the plant, and, after ascertaining the cause, will take action to prevent a recurrence. All this work will be done in the company's time. Mr. Clark closed with an appeal to every workman for his own sake, his fellow worker's sake, and his family's sake, to co-operate in the plan of the company to prevent accidents.

The Trumbull Sheet and Tin Plate Mills

Equipment of the New Works at Warren, Ohio, Which Are Noteworthy Also in Turning Out Formed Sheet Metal Products

An important addition to the steel finishing capacity of the Mahoning Valley in Ohio was made by the recent starting up of the plant of the Trumbull Steel Company, Warren, Ohio. An important feature of this plant is that it is one of the few mills in the country equipped for the manufacture of both sheets and tin plate and for making various formed sheet metal products. The plant contains 12 hot mills, six for rolling sheets and six for rolling tin plate, 13 stands of cold rolls, four single stands and three tandem stands, and it is equipped with 3 galvanizing pots and 20 tin pots. It has an annual capacity of 60,000 tons of sheets and tin plate.

The plant occupies a 70-acre site along the tracks of the Pennsylvania and Erie railroads at the eastern edge of Warren. It consists of three principal buildings, the main

from the usual practice to have the bar bank under cover. A railroad track runs into the plant the length of the bar yard and another track in the adjoining aisle is used for the loading of scrap on cars. The sheet bars are unloaded from the cars into the yard adjoining the track with the crane in that aisle and are piled up until they are needed. The bar yard has a capacity of 10,000 tons.

The sheet bars are picked up by the crane in the bar yard and taken to the shears, where they are cut into lengths as desired, the length of the bar being approximately the width of the sheet to be rolled. Two motor-driven shears are used for this purpose, one having capacity for cutting four bars 8 in. in width and of the usual thickness and the other cutting one bar at a time. The larger shears were furnished by the Mesta Machine



Hot Sheet Mills to the Left and Heating Furnaces to the Right. Bar yard is in the background at the end of this aisle

building, the tin house and a structure occupied by the galvanizing department, sheet pickling equipment, roofing department in which various other formed sheet products are made, and a storage and shipping room. The entire plant is arranged for the convenient handling and loading of material so that there is no unnecessary handling, as well as for convenience in loading on cars when the material is ready for shipment.

The main building is a steel structure 250 ft. wide and 800 ft. long. It was designed and erected by the Riter-Conley Mfg. Company, Pittsburgh, Pa. The sides are covered with corrugated sheets and roofing is of the same material. The building is divided into three bays or aisles. The first on the right or south side is the bar yard and hot mill aisle. This is 68 ft. wide. The middle aisle occupied by the shearing and opening department is 42 ft. wide and the south aisle containing the cold rolling annealing and tin plate pickling departments is 78 ft. wide. In addition there are on each side of the building lean-tos 26 ft. wide. In the lean-to on the south side the heating furnaces are located and in the one on the north side are the annealing furnaces. Each aisle has a crane runway its entire length. The south aisle is served by two 25-ton cranes, the center aisle by a 10-ton crane and the north aisle by a 10-ton and a 20-ton crane. These electric traveling cranes as well as all the other crane equipment throughout the plant were furnished by the Morgan Engineering Company, Alliance, Ohio. The east end of the south aisle is occupied by the bar yard, it being a departure

Company, Pittsburgh, and the smaller by the United Foundry & Machine Company, Pittsburgh. The shears are located about 25 ft. from the first heating furnace, so that the bars have to be carried only a short distance after being cut to lengths. In the aisle near the shears are two motor-driven roll lathes.

Facing the hot mills there are six pair and six sheet furnaces of the single type for the hot sheet mills, one pair furnace and one sheet furnace being provided for each hot sheet mill, and six single furnaces for the hot tin mills. Each furnace has two separate heating hearths. The furnaces were built from designs of the company. Coal is used for fuel and the furnaces are hand fired. After reheating, the sheet bars go to the roughing mill and then are given the required number of passes through the finishing rolls, the number of passes depending on the gauge. The usual practice in this plant will be to roll the sheets on the same mill that the bars are roughed on.

The hot mills are driven by a double gear from the engine, the six hot sheet mills being located on one side and the six tin plate mills on the other side. The sheet mill rolls are 30 in. in diameter. Usually 26 or 28-in. rolls are used, but the use of the larger rolls is in accord with the tendency toward the adoption of the heavier rolling mill equipment. The tin mill rolls are 28 in. in diameter. The widths of the hot mill rolls are 28, 32, 36 and 54 in. The roll necks on both the hot sheet and tin mills are 23 in. in diameter. The mill housings are extra heavy, weighing 16 tons, and shoe plates of heavy design have 7



Double Annealing Furnaces Located in the North Lean-to of the Main Building

spread with a weight of 1250 lb. per foot. The sheet tin mills and cold rolling mills were built by the Mesta Machine Company.

The hot mills are driven by a 3000-hp. 34 x 60 x 60-in. tandem compound condensing engine driven at a speed of 65 r.p.m. The engine runs on a 57-in. Helander centrifugal condenser. The ratio of the gear driven is $2\frac{1}{2}$. Rolled gears are used. The engine bed plate weighs 85 tons. The engine is lubricated from S. F. Bowditch gravity lubricating system, having a capacity of 300 gal. per hour.

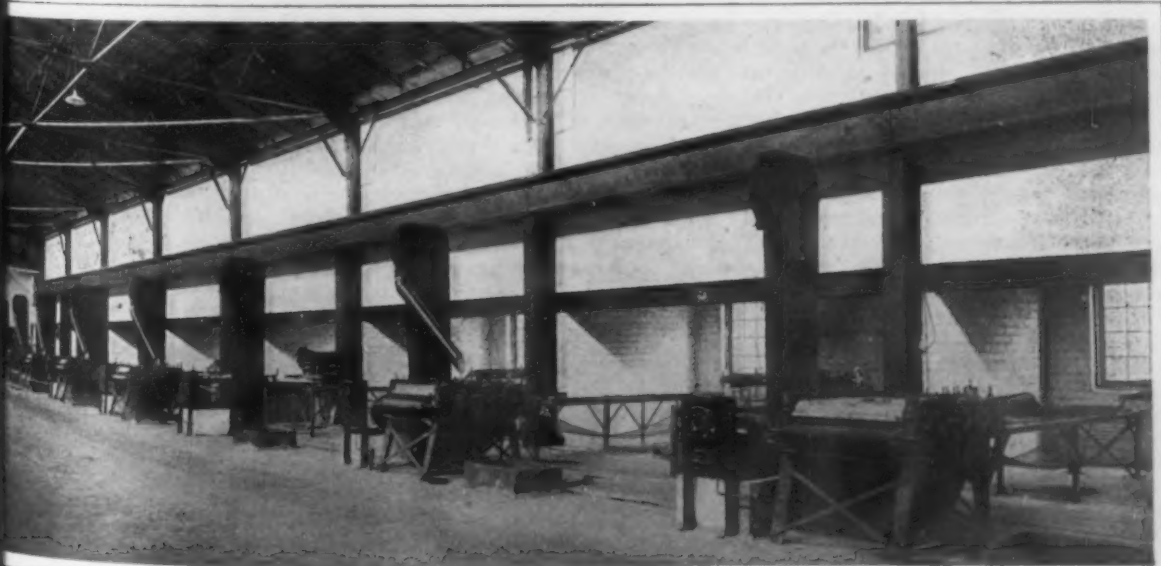
There are four single stands of cold rolls and three tandem stands, the latter being for tin plate. The rolls are 24 in. in diameter and 36, 40 and 48 in. in width. The cold rolls are driven by a 1500-hp. 22 x 42 x 48-in. tandem compound Allis-Chalmers engine driven at a speed of 24 r.p.m. The cold mills are driven through a train of cutters at speeds ranging from 45 to 52 r.p.m., the speed increasing after the first rolls so that sheets will not pile up on each other. One end of the plate and gear housing is unfinished so that they may be extended should additional cold roll trains be installed. Both engines will be equipped with the Schutte quick-closing valves with electric stops, so that the engines can be stopped by means of push buttons in various parts of the building. After the sheets and tin plate are hot rolled they go to the shears to be sheared and resquared. There are 11 motor-driven shears for this purpose, five 144-in. shears for sheets and 48 and 60-in. shears for tin plate. From the shears they receive the finish necessary. Some are cold rolled

before being annealed and some go direct to the annealing furnaces.

In the annealing department there are eight double coal-burning furnaces fired by hand, built from the company's design. Sheets are left in the furnaces from 12 to 36 hr., according to the finish desired. From the annealing department the sheets are taken by the crane to the transfer car at the end of the aisle and on that to the galvanizing department. Tin plate is pickled in the annealing department before being taken to the tin house, the pickling being done on two Mesta 4-armed pickling machines, in connection with which there are the necessary washing tanks.

Parallel to the main building and north of it lies first the tin house and then the galvanizing and roofing building. A track on which is operated an electrically driven transfer car extends from the west end of the main building near the cold rolls to one end of the tin house. Another track on which is operated a second transfer car runs into the east end of the main building and across to the galvanizing department. The tracks are depressed so that the floors of the cars are about on a level with the floor of the mill building.

The galvanizing and roofing departments, in which all the formed products are made, are housed in a building 150 ft. wide and 600 ft. long, of structural steel and brick construction and with a concrete floor. The north end of the building is used for the storage and shipping department and the south end is occupied by the galvanizing and formed roofing departments. The galvanizing department is separated from the other two departments by a cor-



Row of Tinning Machines on One Side of the Tin Mill

rugated steel partition to prevent fumes from escaping from that department into other parts of the building. It is equipped with three motor-driven, coal-fired galvanizing pots. Additional galvanizing pots are to be installed shortly. Material is handled with a 15-ton crane. There are also two electrically operated pickling machines of the double plunger type. After the sheets are hot and cold rolled and annealed they are put in pickling tanks containing sulphuric acid, where they are pickled a short time. They are then given a bath in water and are kept in storage in water until they are wanted for galvanizing. Before going to the galvanizing pots they are placed in tanks containing muriatic acid. Afterward they go into a roller level and are delivered through the partition separating the galvanizing department from the roofing department to the cooling wheels on one side of the latter department. There are three cooling wheels, each of which holds about 25 sheets.

The roofing department contains a corrugating machine with a capacity of making corrugations from $\frac{5}{8}$ to 3 in., and handling sheets up to 144 in. in length, a crimping machine that makes $\frac{3}{16}$ in. cross crimps, a curving machine for curving corrugated sheets, a machine for making locks on metal shingles, two hammers for die work for

x 21-in. Buckeye engines direct connected to 200-kw. Westinghouse direct-current generators, which furnish electric power and light throughout the plant. The water supply is secured from the Mahoning river nearby by means of a De Laval centrifugal pump direct connected to a 75-hp. Westinghouse motor, driven at a speed of 1100 r.p.m. and having a capacity of 3500 gal. per min. The pump is located in a pit in the power house.

Elaborate facilities are provided for loading the finished product. Covered loading platforms extend the full length of the roofing department on each side and there is another loading platform along one side of the assorting room of the tin house. Tracks run along the platforms so that 50 cars can be placed for loading at one time. The yard is well covered with switch tracks and the company operates its own switching engine, which was furnished by the Davenport Locomotive Works. Its various lines of products enables the company to ship carloads of mixed material. The office building is located at the plant and is a fine brick and stone structure.

The products of the sheet mills include black sheets which are made in a great variety of finishes, galvanized sheets, flat corrugated sheets and curved corrugated sheets. The plant is equipped to make sheets from 12 to 30 ga.



Roof Department; Sheets are Delivered from the Galvanizing Department on the Left to the Cooling Wheels; Large Corrugating Machine is at the Right

ceiling and siding, a brake, a painting machine and other equipment. Individual motors are used for driving the machinery in the roofing department.

The tin house is a structural steel and brick building 43 x 440 ft. It is served by a 5-ton electric crane. A partition through the center divides the building in two sections of about equal size, one of which is used for the manufacturing department and the other for the shipping department. The tin plate, after leaving the hot mills, is pickled to remove the dirt and loose scale; then annealed to soften the plate; then each sheet is given three passes separately through the cold rolls to give the plate surface, after which it is repickled and reannealed. Then the plate is conveyed to the tin house on the transfer car in boshes filled with water. In the tin house the plate is tinned, polished, assorted for primes and wastes, reckoned and boxed ready for shipment. If it is for domestic shipment it is placed in wooden boxes, but if for foreign shipment it is placed in air-tight metal boxes.

South of the main building is the boiler house in which are installed six 500-hp. Sterling water-tube boilers. An order has also just been placed for 12 Murphy stokers and a complete ash-handling plant to be installed by the Dempsey Degnan Company, Pittsburgh, Pa. Sufficient space is provided between the main building and the boiler house for a steel trestle on which coal is dumped from hopper cars to concrete bins beneath. These fuel bins are in convenient reach of the heating furnaces as well as the boilers.

In the power house near the boiler room are two 17½

and in all of the standard widths and lengths. The tin mill is distinctly a specialty mill making various grades of tin plate, high-grade terne plate, genuine charcoal iron terne, long terne sheets, continuous roofing tin, bright charcoal tin, bright coke tins, I. C. fire-door plate and furnace pipe coils. The products of the roofing department include corrugated roofing and siding, 3-V crimped roofing, precast standing seamed roofing, roll and capped roofing, plain self-capping roll roofing, plain and corrugated ridge metal ceiling and metal shingles and tile.

The Trumbull Steel Company was organized two years ago and began the erection of its plant, which represents an outlay of about \$2,000,000, in May, 1912. The plant was placed in operation July 31. At the head of the company as president is Jonathan Warner, who was for a number of years general manager of the sheet mills of the American Sheet & Tin Plate Company. In 1906 he purchased the Empire Iron & Steel Company, Niles, Ohio, of which company he was president. This plant was later taken by the Brier Hill Steel Company. The vice-president and general manager of works is W. T. Hardesty, who for a number of years was a district manager of the American Sheet & Tin Plate Company, and later general manager of the Empire mills at Niles. Other officers are W. H. B. Warner, assistant to the president; D. W. Kerr, secretary and treasurer, and G. T. Thomas, general manager of sales. The company has established district sales offices in New York, Chicago, Philadelphia, St. Louis, San Francisco, St. Paul, Detroit, Houston, Tex., and Nashville, Tenn.

Building for Government at Bethlehem Works

Offices and Laboratories Provided for Army and Navy by Bethlehem Steel Company

A reception on Thursday afternoon, August 28, tendered the officers and superintendents of the Bethlehem Steel Company, by the officers and inspection forces of the United States Army and Navy stationed at the works of the company. South Bethlehem, Pa., marked the formal opening by the company, of a handsome and modern office and laboratory building for the use of the Army and Navy officers and inspectors located at the Bethlehem works inspecting materials for the Government under manufacture by the company.

The United States Government maintains a permanent force of approximately 30 men at the Bethlehem works, who are engaged in the detail inspection of armor plate, projectiles, field carriages and other munitions of war, as well as heavy battleship shafting and miscellaneous forgings. At the present time the company is manufacturing armor plate for the battleships Nevada, Alabama, and Pennsylvania. It also has in process of manufacture forgings for guns of various calibre, ranging from one-pounder to 14 in. Similarly, in the projectile department armor-piercing and target projectiles, as well as shrapnel, these projectiles ranging in size from one-pounder to 14 in., are being made. In the general machine shop there is in course of manufacture forgings for torpedo boats, submarines and other Government vessels as well as for the battleships. Quarters, in another building, are provided by the company for the officers of foreign governments located at the works, who are engaged in inspection of similar material.

Few people are aware of the severity of the United States Government specifications. Details of manufacture, in the casting of the hot metal to the finished product, are subjected to minute scrutiny. As an example of the same care may be mentioned the "bore searchers," consisting of powerful electric lights used in conjunction with mirrors set at an angle on the end of a rod, to enable the inspectors, with the assistance of field glasses, to observe every square inch of interior surface and in this way be sure that there are no blemishes or imperfections on the interior surface of the steel.

The building is one-story in height, 45 x 120 ft., surmounted by a battlement of the later English period, and the entrance is of classic design. The structure is of brick and concrete, with cast cut stone trim to correspond, with the steps and balustrades. The building is of fireproof construction throughout. The interior has a separate suite of offices for each department. The Army department is located on one side and the Navy department on the opposite side of a large hallway running the entire length of the building. Each suite has a private consultation room with ornamental fireplace, polished oak floors, with adjoining tiled private bath for the chief of the department. Adjoining these rooms are rooms for the assistants, stenographers, etc. Beyond these rooms are comfortable rooms for the inspectors and clerks, and conveniently located to these latter rooms are fireproof vaults for the Army and Navy records.



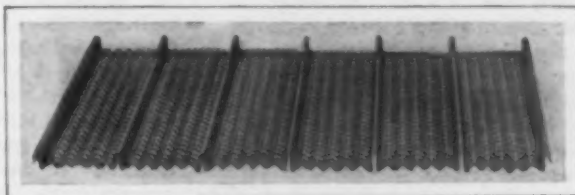
Office and Laboratory Building for Army and Navy Officers at Bethlehem Steel Works

At the far end of the building is located a modern chemical laboratory, containing approved sanitary equipment and furnishings, all fireproof as far as possible, being constructed of Alberene stone, glass and terracotta. The entire interior of the laboratory is lined with salt-glazed brick and tile of the best quality. The flooring is composed of marbleoid to resist acids and give good wearing and resilient surface. There is a separate room for the chief chemist and the balance scales.

A general toilet has been provided, with tiled sides and ceilings and terrazzo floor. The building is heated by low-pressure exhaust steam. One of the features of the building, the entrance, has been set back about 25 ft. from the line of the avenue. Cement walks, drives and curbing are to be provided, and all the adjoining grounds will be tastefully laid out in grass and shrubs, following the general system adopted by the Bethlehem Steel Company in regard to parking and beautifying the surroundings of its buildings, departments, etc.

New Fabric for Reinforced Concrete Work

A new product known as seven-rib Hy-Rib has been placed on the market by the Trussed Concrete Steel Company, Detroit, Mich. This product replaces the reinforcing material known as four-rib Hy-Rib and is an improvement



A New Steel Sheet Reinforcing Material for Reinforced Concrete Work

over it, the sheet being 24 in. wide, or twice the width of the former product, and the ribs are $\frac{1}{8}$ in. deeper. The advantages claimed for this new product are a saving in labor, time and expense of installation, as well as the securing of a wider spacing between supports. Like its predecessor, the material is designed for use in all sorts of reinforced concrete work and can be supplied in sheets 6, 8, 10 and 12 ft. long and 24 in. wide between the centers of the outside ribs, or can be furnished bent to conform to different commonly used curves. The ribs are 15/16 in. high and are spaced 4 in. on centers. The material from which these sheets are made is No. 22, 24, 26 and 28 gauge steel.

A merger has been effected of the Alabama Power Company, Alabama Electric Company, Wetumpka Power Company and Alabama Power Development Company. The Alabama Power Company is the name retained. It is developing hydroelectric current on the Coosa River. James Mitchell, of London, has retired as president and Frank S. Washburn, of Nashville, Tenn., has been elected in his place. J. W. Worthington, of Sheffield, Ala., has been elected vice-president. Mr. Worthington announces as among the plans of the company the erection of a cyanide factory and an electric steel furnace. The company owns several valuable power sites on Alabama rivers.

The General Enameling & Stamping Company, Canton, Ohio, has practically completed its new plant for the manufacture of kitchen enameled ware. This company, which is controlled by the Berger interests in Canton, is now engaged in some experimental work and expects to place its plant in operation in about 60 days.

A Machine for High Production in Boring

Details as Applied to Machining Railroad Car Journal Boxes

A machine built particularly for boring and finishing railroad car journal boxes but undoubtedly capable of being applied to other somewhat similar machining work, has been brought out by the Detrick & Harvey Machine Company, Baltimore, Md. Some idea of the machine may be obtained from the accompanying reproduction of a photograph. It is substantially a double unit, the motor on the bracket in the foreground, incidentally thus forming a contained feature of the machine, driving by means of the gearing two parallel spindles; each spindle drives a boring bar, one on each side of the machine, making, as stated, substantially two machines on the one base. A pair of the parts to be machined are placed in a pair of jaws on opposite sides of each boring bar, so that four boxes are machined at one time. The machine is, in a word, a production of relatively special application, capable as a result of a high production, particularly where numerous articles of the same general type have to be finished.

There are three cutters wedged in each boring bar, one in about the center, which is provided to do the main work of boring, one toward the headstock of the machine, which cuts on a large radius out of the end of the boxes, and a third toward the opposite end of the bar, which cuts a small radius at the other end of the bored out surfaces. The boring bar has no longitudinal movement, but is secured to the end of the driving spindle in a socket, and at the far end runs in a bearing in what corresponds to a tailstock. In this are some change spur gears, which are made to revolve a lead screw extending along the machine underneath each carriage. The carriage carries a split nut which is made to close around the lead screw by means of a lever, and the carriage with the car boxes clamped in jaws is placed toward the headstock. After being bored by the middle cutter, the boxes are fed up to the cutter which cuts the large radius, the nut is then disengaged and the boxes are fed by hand by means of the spider shown to the rear cutter, which finishes the operation as stated. The boring bars are of steel, 3 11/16 in. in diameter, for use in boring boxes 5 in. and larger in diameter, and the machine is designed to finish all sizes of boxes up to and including the 6 x 11 in. M. C. B. standard car box.

As regards the machine in general, it is to be noted that the bed of the machine is of the double shear type, 45 3/4 in. in width over all and 12 3/4 in. deep, supported on two pedestals. The center of the spindle bearings is 13 in. above the top of the shears. The spindles are of cast iron, 4 3/4 in. in diameter, with 17 in. bearing in the headstock. The socket into which the boring bar is fixed is attached to a sleeve and the sleeve is engaged or disengaged with the spindle by means of a sliding tooth steel clutch. the

lever for which may be seen immediately above the headstock.

The carriages have a sliding motion on the shears of the machine bed and may be operated by hand or power. There is a quick hand motion by means of the spider working on a rack, a hand wheel on the end of the lead screw, and power action by the spur gearing at the end of the bed, as stated. The little hand wheel shown operates a right and left hand screw for clamping the work in place and the work is further held in the jaws by means of a hinge bolt spanning the space across the top of the jaws. The feed screws are 1 3/4 in. in diameter, and provision is made for protecting both the screws and nuts from chips by covers. As the motion to the carriage mechanism is taken from the spindle, the feed of one of the machine is in action only when the corresponding spindle revolves. A 12 1/2-hp. motor is ordinarily installed with a speed variation of 1 to 2, giving spindle speeds of 25 to 50 r.p.m. and feeds to the carriage of 1/16, 3/32, 1/8, 3/16 in. per revolution of the spindle.

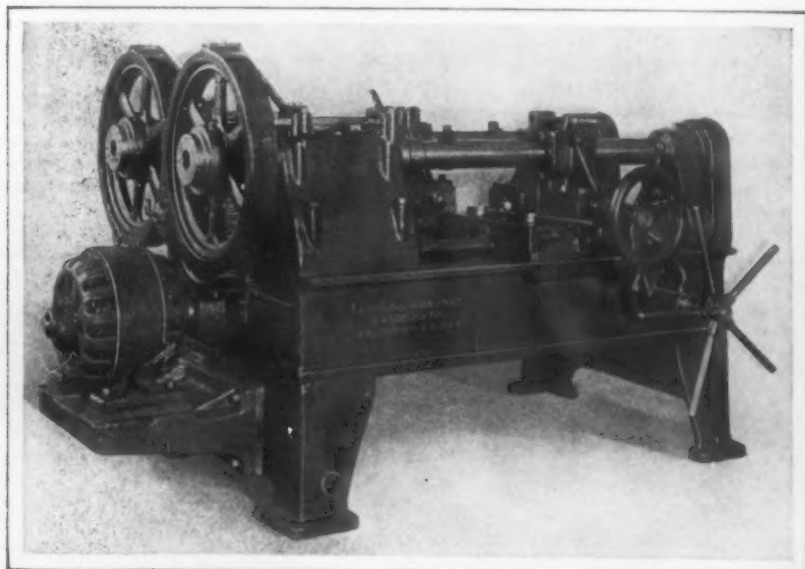
Oxygen Production in the United States

The quantity of oxygen produced daily in the United States, according to current estimates, is around 600,000 cu. ft. Of this quantity approximately one-half is supplied by central stations situated in different parts of the country, the rest by plants in individual works. The majority of these central stations are operated by the Linde Air Products Company, using the well-known Linde liquid air method. There are several electrolytic works, of which the largest are operated by the International Oxygen Company, Newark, N. J.; Oxyhydric Company, Milwaukee, Wis., and Dayton Oxygen & Hydrogen Company, Dayton, Ohio. The International Oxygen Company has installed a considerable number of plants under its system for individual users. Besides these there are a great many oxygen equipments making gas by the Brinn process and by the chlorate of potash method.

Oxygen is much in demand for fine welding and cutting. This latter branch is being rapidly developed in this country, particularly in combination with hydrogen. The large steel and electric companies make considerable use of oxy-hydrogen. The railroads, however, who are such large factors in the use of oxygen in Europe, have not adopted this method on any large scale in this country. The Union Pacific and the Illinois Central are perhaps the largest users of the autogenous method among railroads. The United States Government uses considerable oxygen and hydrogen in the different navy yards; but on the whole the ship builders are just beginning to apply oxy welding and cutting torch in their yards. The range boiler works, tube works and manufacturers of steel barrels and liquids are among the largest users of oxygen. Some of the welding is being done here, in some instances very intricate jobs being carried out by this method. There is a large number, however, of well-instructed welders. The art is so young that there has not yet been formed a large contingent of experienced workers.

A new booklet entitled "A Business Compass," showing how use is made of tabulating machines to analyze business conditions of all sorts in factories, wholesale and retail houses, insurance offices and railroad and express companies, and for sales analysis, cost accounting, etc., has been issued by the Tabulating Machine Company, 25 Broad street, New York.

The Canton-Hughes Pump Company, Wooster, Ohio, a few days ago shipped four large pumps to Brisbane, Australia, where they will be installed in a meat packing plant of Swift & Co.



A Boring Machine with Two Boring Bars Fitted for Finishing Four Car Boxes at a Time

Preparing Steel for the Microscope*

Imbedding Specimens in an Alloy Insures Speed in the Examination of Defects

—BY ALFRED CAMPION AND J. M. FERGUSON—

In investigations relating to the breakdown of metals under stresses, however they may be applied, it is now recognized that an examination of the fracture, or of a section through the fracture, is often of the greatest importance, in order to determine the manner in which rupture has taken place, before deciding upon the suitability of material for a particular purpose.

As is well known, steel that has shown excellent results regarding tenacity and ductility in an ordinary static test frequently fails under a load much below the maximum stress, or indeed the yield stress of the metal as shown by the usual tensile test; such material under impact or dynamic stress breaks suddenly, and appears to be very brittle. In such cases an examination of a section through the fracture often reveals the reason for such apparently extraordinary behavior of the material. Rosenhain has shown the importance of a knowledge of the manner in which fracture takes place, in metals and alloys, and its bearing upon engineering and other problems. He has demonstrated how differently the same material may behave when submitted to variously applied stresses.

The preparation of sections of fractures for microscopical examination, especially of soft and ductile materials, presents considerable difficulty, as during the polishing operations the edges of the fracture become more or less rounded or worn away, and its true nature is not discernible. In order to overcome this difficulty Rosenhain employed an ingenious method of imbedding the fracture in copper, and then cutting through the copper and steel in the desired direction, much in the same way that the microscopist imbeds his specimens in wax before sectioning. This method of depositing copper (or iron) electrolytically gives excellent results, and is quite satisfactory where comparatively few specimens have to be examined, where no great hurry is necessary. It requires, however, strict attention to details, and it takes considerable time to obtain a deposit $\frac{1}{8}$ in. in thickness. There are many occasions when an examination of a section through a fractured test piece would be of immense value, provided that it could be made easily and quickly.

The authors recently had occasion to examine a very large number of fractures of static and impact tensile and other test pieces. The time at their disposal was, however, too short to allow of their being prepared by the Rosenhain method of electrolytically depositing copper or iron, and they were led to consider the possibility of other methods. It occurred to one of them that it might be possible to cast an easily fusible alloy around the fractured end of the test bar and then section and polish. The conditions to be satisfied appeared to be:

1. The alloy must be of such a nature that it would readily penetrate into and fill up the minute fissures in the fracture.
2. It must be sufficiently hard and strong to support the edges of the fracture during polishing.
3. It must melt at a low temperature, so that no alteration of the structure of the material would be produced.
4. It must adhere closely and strongly to the specimen, and not be torn away from it during the operations of grinding and polishing.
5. It must exert no chemical or other action on the edges of the specimen.
6. It must be of such a nature that the edges of the fracture would show up sharply and clearly even after fairly strong etching.

Experiments were carried out with a number of alloys, and eventually two were found that fulfilled the above conditions in a marked degree. The composition of the alloys was as follows:—

	Alloy A	Alloy B
Copper	50 parts	50 parts
Lead	30 parts	30 parts
Iron	25 parts	10 parts
Antimony	3 parts	10 parts

Both alloys melt at temperatures below the boiling point of water, the melting point of B being about 25 deg. C. less than that of A. As a result of a large number of trials the alloy A was found to be the better for general

work. The method adopted in preparing the sections was as follows:

The fractured test piece was dipped momentarily in hydrochloric acid of 1.1 sp. gr. and then in a solution of chloride of zinc, the ordinary "killed spirits" of the tin-



Fig. 1—Unetched Photomicrograph Showing Union of Alloy and Steel

Fig. 2—Etched Section Through Fracture of Repeated Bending Test Piece

Both Reduced About One-third from 250 Diameters

man, prepared by adding zinc to strong hydrochloric acid until no further action takes place, and then diluting with an equal volume of water. The end of the specimen was then plunged into a quantity of the alloy at such a temperature as just to keep it molten, and contained in a small, deep, narrow mold or crucible. The cold specimen usually somewhat chilled the alloy and caused partial solidification. It was therefore found advisable to remelt the alloy by gently warming the mold or crucible so as to allow of the escape of any air which might have been trapped, and also to insure perfect adherence between the alloy and the steel. The latter being lighter than the alloy, the specimen must be weighted or held down in the molten alloy to the necessary depth until solidification takes place. When cold, sections may be cut in any desired direction by means of a fine saw. Polishing can then be carried out in the usual manner.

Fig. 1 shows a section of a tensile impact fracture of soft steel imbedded in the alloy, polished, but unetched, showing the junction of steel and alloy.

Fig. 2 is a photomicrograph of an etched section of a repeated bending (Sankey) test piece.

The authors claim no advantage for this method over the Rosenhain method of deposition except that it is very much quicker. A section may be prepared and a photograph obtained in about thirty minutes. They hope that it may be of interest to those who, like themselves, may wish to examine large numbers of specimens, but whose time is limited.

The Philadelphia Foundrymen's Association

The Philadelphia Foundrymen's Association has resumed its activities after the usual summer recess. It held its regular monthly meeting at the Hotel Walton, Philadelphia, Pa., on the evening of September 3. The attendance was exceptionally good.

The paper for the evening's consideration, entitled "The Grinding Wheel, Its Efficiency and Safety," was read by Francis M. King, treasurer of the Challenge Machine Company, Philadelphia. Mr. King referred in a general way to the history of the emery wheel, or, as he designates it, grit cutting tool, then took up its manufacture and use. He paid particular attention to the grooved surface wheel which his company is placing on the market, and which has been illustrated and described at length in the columns of *The Iron Age*. The highest measure of safety, Mr. King said, is in the hard wheels, which, in the ordinary type of wheel, he considered the least efficient as a cutting tool. Soft wheels, while more efficient in cutting, were more dangerous. Ten per cent. of the grinding cost, in ordinary practice, is in the cost of the wheels themselves, and by the use of properly prepared wheels a large saving could be made. He showed by means of lantern slides a number of grinding machines fitted with safety devices, but in a large number the measure of safety was dependent upon the intelligence and care of the workman using the machine. Following a general discussion, luncheon was served.

*Paper read before the Brussels meeting of the Iron and Steel Institute, September 1 to 4, 1913.

Failure of an Open-Hearth Steel Rail

Engineer-Physicist Howard of Interstate Commission Declares Failure Not Due to Defects in the Rail—Danger Zone in Loading Reached

The Interstate Commerce Commission has made public the result of its investigation of a disastrous wreck October 1, 1912, on the Louisville & Nashville Railroad near Hays Mill, Ala., caused by a broken open-hearth steel rail. The commission finds that the broken rail had developed transverse fissures. The report made to the commission by its engineer-physicist, James E. Howard, reproduces photographs of pieces of the broken rail which have a striking similarity to the illustrations of transverse fissures in the broken rail on the Lehigh Valley Railroad of August 25, 1911, at Manchester, N. Y., shown in *The Iron Age* of October 12, 1911, and as further described and illustrated in a paper on "Rail Failures" presented by M. H. Wickhorst to the American Society for Testing Materials, June 25, 1913, and reproduced in *The Iron Age* of June 26, 1913. It is therefore unnecessary to reproduce them at this time.

The rail which caused the Louisville & Nashville wreck, according to Mr. Howard's report, was of 80-lb. section, rolled by the Tennessee Coal, Iron & Railroad Company in June, 1906, and laid that fall. It was branded "T C I Co. 80 A. S. Open Hearth IIIIII 06." The receiving end of the rail remained intact for a length of 13 ft. 4 in. The leaving end was broken into a number of fragments, 18 of which were recovered, the principal ones ranging from a length of 36 in. down to a length of $7\frac{1}{4}$ in. The rail was fractured across its entire section, head, web, and base, at 14 places. At 11 of these places the metal of the head displayed transverse fissures, which ranged in diameter from 0.37 to 2 in. At only 3 of the fractures, which extended across the head, was the metal exempt from the presence of transverse fissures. These fissures were located either on the gauge side of the head or directly over the web, none being present in the outer half of the head. The minimum distance apart of adjacent fissures was $7\frac{1}{4}$ in., the maximum distance 36 in. Mr. Howard continues:

Chemical Composition of the Steel

The specification under which this rail was furnished required the following chemical composition:

	Per cent.
Carbon	0.55 to 0.68
Phosphorus	(not over) 0.06
Silicon	(not over) 0.20
Manganese	0.80 to 1.10

It was stated that the following composition was attained:

Carbon	0.57
Phosphorus	0.057
Silicon	0.008
Manganese	0.88
Sulphur	0.040

Analyses of the metal of this rail, however, showed a different content in respect to carbon than specified and reported as having been furnished. Analyses of chips taken out near the running surface of the head from the center of the head and from the upper part of the web gave the following results:

	Top of head	Center of head	Upper part of web
Carbon	0.88	0.85	0.84
Phosphorus	0.051	0.052	0.048
Silicon	0.014	0.014	0.019
Manganese	0.68	0.67	0.67
Sulphur	0.035	0.032	0.031

An additional carbon determination was made of metal from the nucleus of a transverse fissure, drilling into the head of the rail at that part of the surface which was the first to separate in the formation of the fissure. The carbon content here was 0.85, showing metal of normal composition according to the previous determinations.

Following is a tensile test of a longitudinal specimen from the head of the receiving end of the rail:

Length of stem	10 in.
Diameter of stem	1.005 in.
Sectional area	0.7933 sq. in.
Elastic limit per sq. in. (approximate)	45,000 pounds
Tensile strength per sq. in. (approximate)	86,850 pounds
Elongation in 10 feet	0.8 per cent.
Contraction of area	1.1 per cent.
Appearance of fracture	Granular

The Rail Declared to Be of Sound Quality

Structurally the metal of this rail appeared uniform as a sound rail, referring to the quality of the metal. Cross sections were polished and etched with tincture of iodine at six places along its length. The etched surfaces were uniform in appearance and substantially free from the dark markings which are frequently displayed by sections. Microscopically, also, the metal appeared uniform and no defects were detected at or in the vicinity of the nuclei of the transverse fissures. So far as could be judged, the formation and extension of these transverse fissures was the result of service conditions to which the rail had been exposed in the track, not materially influenced by structural inequality of the steel.

Transverse fissures have been described in earlier reports of rail fractures and the causes described which are believed to lead to their development. The insidious character of these fissures and their menace to safe travel by rail justifies further remarks upon the probable manner of their formation.

The Cause of Transverse Fissures

This type of fracture seems confined and peculiar to those conditions which affect steel rails. So far as known, internal, progressive, transverse fissures have not been found in other examples of structural steel, nor have they been found in steel rails which have not been in service. The combined bending stresses and intense wheel contact stresses which attend service conditions of a steel rail appear to constitute the features which lead to the formation and development of interior transverse fissures. No other contributory causes have been recognized as being present and active in this connection. Regardless of the grade or quality of the steel there must be present longitudinal strains which cause the separation of the metal of the rail in a longitudinal direction. But the magnitude of the strains necessary to cause rupture will be greater or less according to the grade of the metal.

Since transverse fissures have their origins at the interior of the head and are longitudinal tensile fractures of the metal it is necessary to look for a cause for the transference of the incipient place of rupture from the outside fibers to interior ones. The cold rolling of the running surface of the head by the wheels doubtless occasions the transference. The gauge side of the head is most affected by the wheel loads, and that should be the side of the head to develop interior fissures, as examples of fractured rails have shown it to be.

The effect of the wheels is to put the metal at the running surface of the head into a state of internal compression. The springing of the head into convex shape on the running side, when detached from the web, is evidence of the release of internal compression. The present rail springs in that manner when the head was detached from the web. Herein is found a cause which has a tendency to transfer the incipient place of rupture from the surface to the interior of the head. The metal in compression at the running surface must perforce put the metal next below it in a state of tension and augment the tensile strains of the bending loads. In a way the rail is an example of unsymmetrical loading, or rather presents an unsymmetrical result of loading, with bending stresses alone affecting the base, while the head is affected by the combined bending stresses and internal strains of compression.

The Overloading of Steel Rails

It is not a question of grade of steel whether or not the action takes place, but in specific cases a question of whether it constitutes an overload for the particular steel being used. Rails which develop this type of fracture have certainly been overloaded. The close proximity of transverse fissures to each other precludes the explanation that they are the result of bending stresses taken alone. The results call for the presence of an independent force, the influence of which is felt along the entire length of the head, and such

is the manner in which the compression metal acts. These fissures occur in planes at right angles to the direction in which the rails were rolled their formation should not be looked for as a result of mill practice. Certainly the presence of fissures approaching 2 in. diameter should not be attributed to the action of the rolls of the rail ignoring the fact, for the time being, that such fissures are located on one side only of the head. There is lack of uniformity in steel in the ingot at places where slag inclusions exist, yet such globules, of one one-hundredth of an inch diameter, more or less, are drawn out in the finished rail into longitudinal filaments parallel to the length of the rail. The examination of rail steel through the successive sections from the ingot to the rail has failed to furnish examples of incipient fissures developed at right angles to the direction of rolling.

No method has been found capable of locating incipient transverse fissures and which, it should be remarked, do not show oxidized surfaces. But so grave a matter as this should not be left in its present state of uncertainty, and upon contributory causes, track conditions, wheel loads, and grades of steel in which these fissures appear should all be acquired. Primarily the formation of a transverse fissure is the result of an overload, for that particular, from whatever point the subject is viewed. It is regarded as an imperative duty, which should at once be determined, to ascertain and define the actual stresses to which the rails are daily subjected.

Experiments which were made nearly two decades ago showed the necessity for conducting observations in the track for ascertaining and defining the fiber stresses in rails due to given wheel loads; the moment of resistance of the rail and the tie spacing not being sufficient data on which to base computations for the reliable determination of the actual fiber stresses under given wheel loads owing to the yielding character of the roadbed, hence requiring an experimental determination of the fiber stresses in the track itself. Since those early tests were made wheel loads have greatly increased and, also bearing on the case, wheel spacing has been changed. It can doubtless be said that the information is practically lacking in respect to the stresses in rails which are developed by modern equipment, even under static conditions of loading where no track exists for the acquisition of such data. Commendable efforts have been made at different times in the laboratory to acquire reliable information upon the primitive mechanical properties of the materials made use of in track equipment, but years should not be allowed to pass without corresponding efforts being directed to the material after it reaches the track. Such a dearth of important information as pertains to service stresses in steel rails is probably about a parallel in the history of the materials of construction.

Mr. Howard's Conclusions

In conclusion it appears:

That the presence of interior transverse fissures in the rail under consideration was the cause of the derailment and wrecking of the train.

That 11 such fissures were displayed on fractured surfaces developed at the time of the derailment, and two additional fissures found in this rail.

That the sizes of the fissures ranged from 0.37 to 2 in. diameter.

That they were located in the head of the rail on the large side or directly over the web, none being found on the outside of the head.

That the metal of the rail in other respects was structurally sound and of satisfactory quality and normal to steel in its chemical composition.

That the formation and successive development of these transverse fissures, as a matter of opinion, was the direct result of overstraining loads, combined alternate repeated bending stresses, and intense wheel-contact stresses.

It appears, furthermore, that the carbon content of this rail was 23 per cent. higher than the upper limit of the specifications and 47 per cent. higher than the steel was reported, thus nullifying the value which might attach to the reported composition of the steel and giving such report a trifling character.

That the margin of strength and safety in rails cannot be known in the absence of information concerning the stresses to which they are subjected and that there is immediate and urgent need of instituting an inquiry into the

magnitude of the stresses to which steel rails are subjected in the track.

That the prevention of derailments and the safety of railroad travel will be aided and benefited by the careful determination and definition of the conditions which prevail in the track.

A Railroad Rather than a Makers' Problem

Members of the commission regard the problem of securing thoroughly safe rails as one more for the railroads to solve than the rail makers. They are discussing the advisability of calling a conference of representatives of railroads and steel makers to meet the experts of the commission and discuss the whole situation with a view to arriving at a method to eliminate this kind of a defect, as it is conceded that it develops by use and cannot be detected before the rail is laid. The report of the commission says in part:

"The facts disclosed by the investigation of this derailment emphasize the statements made in a number of other reports dealing with this subject that a most complete and searching examination should be made of the whole question. This examination should deal with steel rails from the furnace to the time they are laid in the track; it should determine whether the tests now used in the steel mills are adequate to detect imperfect rails; it should ascertain whether the use of high carbon steel is not attended with danger not recognized in the drawing up of current specifications; it should be extensive enough to inquire into the causes which contribute toward such a destruction of the structural integrity of the steel as was the case with this rail; it should take up the securing of measurements in the track of the actual fiber stresses which are caused by the new types and weights of locomotives, and under the different wheels of these locomotives, in order to obtain information from which to judge of the severity of the strains to which the track is daily subjected; in fact, track conditions as they exist at the present time should be dealt with even to the most minute detail.

"From the report of Mr. Howard it would appear that the danger zone in the use of steel rails as at present manufactured has been reached, and since it is supposed that transverse fissures are the direct result of high wheel pressure acting on hard steel a complete investigation should be made for the purpose of scientifically determining the matter and ascertaining a remedy. Until such an investigation has been made the danger of similar accidents will exist."

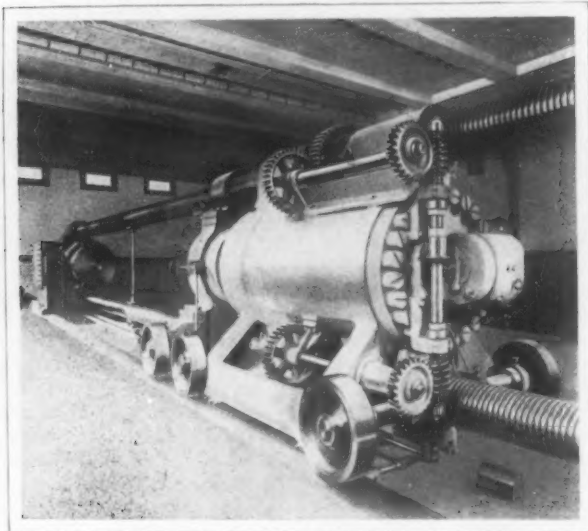
The wreck caused by this particular rail caused one death and the injury of 20 persons. The accident reports of the commission show that in the year ended June 30, 1902, 78 derailments were caused by broken rails, while in the year ended June 30, 1912, there were 363 derailments due to the same cause. In 11 years 2428 derailments have been caused by broken rails and have resulted in the death of 158 persons and the injury of 5117.

Makers of vanadium steel report a constant broadening field for their products in the manufacture of automobiles as well as for other uses. When vanadium steel was first adopted by the automobile manufacturers its use was confined largely to driving and crank shafts and springs. Now it is being extensively used for all automobile forgings, especially for forgings for which a material is wanted that has heavy antifatigue qualities that will resist crystallization, also for cam shafts and steering knuckles. It is in demand from locomotive builders for crank pins, piston rods and driving axles. Vanadium steel is said to be gradually replacing some grades of tool steel. A very tough core is secured by its use for case hardening. It is also found well adapted for special rolls for cold rolling work. Among its other uses is the making of rivet sets.

The Swift Machinery Mfg. Company, Hornell, N. Y., now in process of organization, intends to erect a factory 30 x 80 ft. for the purpose of manufacturing a recently invented belt-splicing machine for making endless belts. The company states that the machine is equipped with a vulcanizer and will cut and glue belts automatically in less than 15 min. It will be made in three sizes, 4, 6 and 8 in.; not much larger than the ordinary vise; can be operated by a boy and will save time and belting, as odds and ends of belts can be utilized. It may take four to five months before the company will begin active operations.

Powerful Precision Testing Machine in Washington

A testing machine has recently been installed at the United States Bureau of Standards, Washington, D. C., for testing columns, blocks, beams, girders and other



Gigantic Precision Testing Machine in United States Bureau of Standards

shapes of steel, iron, wood, concrete, reinforced concrete, etc., in order to determine the breaking strength, the spring under load and other valuable engineering data. It is capable of taking specimens up to 34 ft. in length and can exert a pull of 1,150,000 lb., or a crushing force of 2,300,000 lb. and yet is so delicate that the pressure of the finger may be registered.

The machine comprises two main parts connected by two enormous screws. One part, the farther one in the accompanying illustration, is stationary and contains the mechanism by which the force exerted on the specimen is measured. The other part, called the press, is movable and consists essentially of a hydraulic cylinder mounted on wheels of its own and can move independently of the cylinder. The oil, which is used to produce the hydraulic pressure, is supplied through a pipe which telescopes or elongates as the press is moved.

In testing, the press is moved to the proper point, depending on the size of the specimen, by an electric motor. The specimen is then put in place, being gripped by jaws mounted on each of the ends of the testing machine if it is to be put under tension, or held between two heavy plates if it is to be compressed. The hydraulic piston is then slowly forced forward or pulled back, depending on whether the test is of compression or tension, until the specimen under test is ruptured. A Deane pump driven by a 20 h.p. Westinghouse motor supplies the oil for operating the hydraulic cylinder. This pump is capable of delivering oil at a pressure of 3500 lb. per square inch.

The Tehuantepec Railroad is likely, in the opinion of Engineering of London, to prove a serious competitor of the Panama Canal. Comparing the Tehuantepec route with other world routes, say, from New York to Yokohama, it is noted that the distance by way of Cape Horn is 19,802 miles; by way of the Cape of Good Hope, 18,085 miles; by way of the Suez Canal, 15,527 miles, and by way of the Panama Canal, 11,256 miles, whereas the distance via the Isthmus of Tehuantepec is only 10,006 miles. The question is mainly whether or not the saving of 1150 miles would be counterbalanced by the cost and delay of transshipment, leaving out of account for the moment the difference between canal tolls at Panama and railroad freight at Tehuantepec.

N. D. Doxey, Elmira, N. Y., dealer in old material, has purchased the plant of the Elmira Rolling Mill Company, and will dismantle it. It has not been in operation for several years, but when last active manufactured bar iron, having an annual capacity of about 15,000 tons.

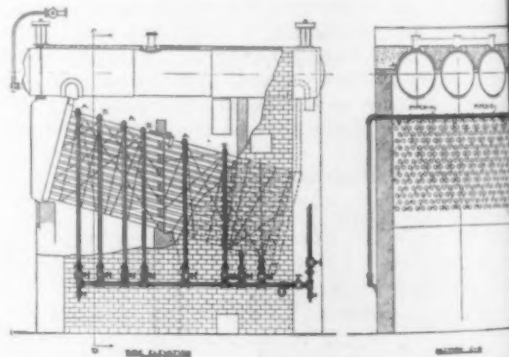
A Soot Cleaner as Part of a Steam Boiler

A soot cleaner for the steam boiler, comprising a system of perforated pipes extending across the tubes of the water-tube boiler, with the nozzles close to the surfaces, so that by means of steam controlled from outside of the boiler setting the deposit from the tubes may be removed, has been developed by the Vulcan Soot Cleaner Company, Dubois, Pa. It is a production which recognizes the desirability of having a ready means of cleaning the tubes at close intervals, thereby overcoming the objection of the boiler room attendants to the awkward and sometimes difficult method of cleaning the tubes by ports in the setting and thereby also overcoming the tendency to delay cleaning.

Some extended investigations on the part of the Vulcan company appear to show that soot, so called, is not simply lamp black, but that if the deposit is allowed to accumulate a fusing occurs in time, forming clinkers which not only interfere with the flow of heat through the metal of the boiler tubes, but entangle a thicker film of gas than would otherwise be the case. For example, it is stated that sooty deposits found in modern boilers may be classified as follows: 1, Molten slag which forms as stalactites hanging from the lower row of tubes when set close to the fire, though this formation is not common. 2, Clusters of ash on top of the tube, found usually only in the first pass. 3, Cemented mass of clinker, found only in the lower part of the first pass. 4, Scaly deposit due to moisture in the products of combustion, cementing the ash deposit. Loose soot, fine ash, clay and other earthy matter.

Some idea of the Vulcan soot cleaner may be obtained from the accompanying illustration, which shows the machine both crosswise and lengthwise of the boiler. It is stated that by the numerous nozzles the tubes on the far side of the boiler are cleaned as thoroughly as those on the near side. The scheme allows for blowing the boiler frequently and it is customary in some plants to blow them out every watch, which is, of course, oftener than is commonly done by hand. It is emphasized, also, that the blowing does not reduce the furnace efficiency, as no doors have to be opened, allowing an infiltration of air. In fact, it is stated that in one plant now being installed, having two boilers, the blow doors are omitted entirely.

From some figures obtained from the engineers of the New York office of the Vulcan Soot Cleaner Company



The Vulcan Soot Cleaner Installed in a Water-tube Boiler

is stated that one month's cleaning the tubes by hand showed an average leaving temperature from the boiler of 517.8 deg. and an average carbon dioxide of 11.2 per cent. A similar set of readings covering the same length of time when the boilers were blown every day with the Vulcan soot cleaner gave a temperature of 391.8 deg. and an average carbon dioxide in the products of combustion of 11.8 per cent. It is figured out that with the reduced temperature and substantially the same carbon dioxide in the outgoing gases there is a saving of 6 per cent. in the fuel. It is stated further that the Louisville Railway Company on the basis of an evaporative test showed a saving of 9 per cent. in the fuel bill, and the Champion Cattle Paper Company a saving of 7½ per cent.

The Fulton Machine & Forging Company, Canal Fulton, Ohio, has been sold at private sale, under authority of the Federal Court, to the principal stockholders, who reside in Canton. The consideration was \$28,000.

Plea for Uniform Boiler Specifications*

Uniformity Desirable in the Interests of Both Consumer and Manufacturer—Practical Specifications Recommended

BY THOMAS E. DURBANT†

The possibility of uniform specifications for boilers is met with many difficulties. However, I feel that the difficulty has been overcome, and that united action among boiler makers will bring about the much desired uniform specifications. I think that we all have been possible to a degree for not having a uniform specification, owing to the fact that we have been consumed in petty jealousies, each of the other. Our endeavor to slight advantages by making changes in specifications in order to get business has retarded the progress of such specification.

While we would all unite in a general way in singing praises of the uniform specification, we did not exert any degree of sincerity in our attempt to get to the bottom of the proposition. Now that various States and we have taken up the matter, and prohibited the common practice of salesmen cutting specifications and making changes in order to get business, it is the belief we will have closer co-operation among the manufacturers of boilers, to the end that we will all figure on the same thing. Now that we are united and all see the advantages to everyone of the uniform specification, our trouble, we believe, is over; notwithstanding the fact that we run against a problem that at times has vexed this nation, that is, the problem of States rights.

Has Labored Long for a Standard Specification

The standard specification has for many years been the desire of the company that I represent, and we have been working consistently to that end. About ten years ago we addressed a letter to all boiler makers in the United States, trying to get some concerted action. The replies that were received were most agreeable, but the action was not there.

We took the matter up with our Congressmen and Senators, and finally, during the occupancy of that office by Mr. Taft, with the President of the United States, pointing out to him the necessities of a standard specification from the public's viewpoint; citing to him that the United States exercised jurisdiction over boilers on navigable waters in order that it might protect, as far as possible, the lives and property of people who used these boilers as a means of transportation, and citing to him that life was not less dear to the man who lived on land than to the man who lived on the water and pursued his occupation on the land than the man who pursued his occupation on the water. However, we ran across that unsurmountable barrier of States rights, when we urged the necessity of a common law governing the building of boilers. In spite of my argument that we could bring about, we landed in the same place. Our Congressman would have been glad to have introduced a national law, but after consultation with the President, decided with him that it was absolutely useless.

In spite of this, however, a law was passed governing motive boilers as used on railroads. This was cited as a reason why there should be a universal law governing all boilers, but as a matter of fact it was also pointed out that a national law was possible in this case because of the fact that these boilers were engaged in interstate commerce. There was a time when locomotives could have been halted at the threshold of a State and not allowed to cross the line, due to great variations of laws governing the construction of boilers.

Manifest That Boilers Must Be Built to Standard

Now fortunately, due to various causes, it has become manifest that boilers must be built better and nearer to

a common standard than ever before in this country. The large number of laws has made it almost imperative that a man who is engaged in the manufacture of boilers for distribution throughout the United States should throw his whole energy into having the law so constructed that he does not have to carry a stock of material and stock of boilers on hand to meet the requirements of the various laws in the various States and cities. These laws, varying as they do, one from the other, make a needless waste, and as the cry of the country now is for conservation and economy, we think that this argument can be well used with the law makers of all the States who will take the subject up. The waste comes from the fact that a manufacturer is now almost compelled to build each boiler to meet the requirements of each law, necessitating slow progress through the shop, and enormous investment in material. The further fact that different manufacturers put different interpretations on the laws brings about a great conflict in the price of boilers.

With a uniform law and the co-operation of all manufacturers, these differences would be largely overcome, so that the boiler would reach the consumer, not only a better boiler, but for less money. Not only would the manufacturer be able to produce the goods and sell them for less money, and be more certain of his profit, but he would eliminate the probability of a large loss in case his foreman or designing engineer should get confused in the various laws. I think there is no concern manufacturing boilers that has not suffered from the lack of uniformity in State or city laws, and of those engaged in making various types of boilers for distribution throughout the entire country and in Canada, I venture the assertion that there is no one that has not met with very considerable loss. All this can be eliminated; the public can be protected, both as to its life and its investment; the manufacturer can make more money on less investment, if we can succeed in getting concurrent legislation, or approximately concurrent legislation, in various States.

Concurrent Legislation Needed in All States

We are fully alive to the fact that no problem that has ever faced the American people has been more discussed than concurrent legislation. The different laws in different States tremendously embarrass manufacturers doing interstate trade, and they affect our social relations. We know the action that has been put forth to have uniform marriage and divorce laws, uniform laws for crime and on credit, and on other matters too numerous to mention, but we believe no subject for concurrent legislation has been broached by people who have been so unitedly combined as to what was required as this problem that we have. And there is no doubt in the writer's mind that a conscientious effort on a specification upon which we have all united will influence the law makers in a great number of States who have not yet passed a law and in turn will influence the laws already on the statute books to such an extent that corrections will be made in them to make them conform to a standard which we can and will ultimately adopt.

It seems to me that beyond doubt a concurrent effort among the manufacturers of boilers and mechanical engineers and users of boilers cannot help but bring approximately concurrent legislation. As it is now, the laws are confusing in the extreme, and it requires the undivided attention of a bright mind to so issue the orders to the shop that the boilers will come through without trouble.

The Present Diversity of Boiler Laws

Boiler laws are coming out from the East, West, North and South—in every direction. Not only are the

*Read before the American Boiler Manufacturers' Association, Cleveland, Ohio, September, 1913.

†General manager Erie City Iron Works, Erie, Pa.

laws themselves different, but a different interpretation has been put upon the same law by different inspectors and different builders. I presume without exaggeration that there are at least 100 laws and changes to laws in the United States alone, governing the manufacture of our product, and this can be multiplied by a thousand times as many inspectors as there are laws.

For instance: We have asked a decision of one point—the butt strapping of drums. It is our interpretation of the law as it is written, in several of the States, that it is necessary to make all butt strapped seams to a minimum length of 12 ft. We have been informed by some inspectors that this does not apply to water-tube boilers, and by other inspectors that it applies to all boilers. We conformed our specifications to meet the letter of the law; that is, to have no butt strapped seams over 12 ft. long, whereas we have found out since we put this order into effect in our works that many boilers or drums of boilers are being made and passed with butt strapped seams as long as 20 ft.

In spite of all this, we are thoroughly impressed that the boiler inspection laws have been and will be beneficial to us all—all the boiler manufacturers and all the users—and that out of it will come the ideal boiler in design, workmanship and material, and this is a consummation to be desired; so that when we come to figure on a job we will be all put on the same basis, and it will be necessary for us all to furnish a boiler that, in the estimation of all the law-makers, will be the best boiler made.

Boiler Laws Grouped

The present laws as enacted have been of great benefit, as they have reduced what was formerly opinion, and frequently guess-work, to something definite and right. As we now have them, they have been classified by our engineers in three groups:

1. The group comprising Massachusetts, Ohio, Detroit, Manila, Chicago and Indiana. Detroit, Ohio and Manila laws are practically identical. Massachusetts law differs somewhat, and the Chicago and Indiana laws are modifications.

2. The group comprising all British specifications in which we are interested—British Columbia, Alberta, Saskatchewan and Ontario—which are all copies or modifications of the British Columbian law.

3. The group comprising inspection laws of Philadelphia, Seattle, St. Louis, Los Angeles, Montana, New York and others. The laws of this group differ from each other, but in a general way are less complicated than those of the other groups.

All the laws in the United States unite on a factor of safety of five. The Canadian laws require a factor of safety of five and a half to six and a half, and it is optional with the inspector what factor of safety he will accept, depending upon his opinion of the good workmanship that is done and upon just how the boiler happens to strike his fancy. The material for Massachusetts, Ohio, Detroit and Manila is special, both as to the chemical and physical properties. A certified mill test is required for all plate material, and the plates must be stamped in five different places. Other inspections require only a mill test, and are not so particular about the chemical analysis of the material.

We at one time had a boiler refused in Massachusetts, because the chemical analysis of sulphur was off one-thousandth of one per cent. We have now coming through our shops, as we presume most of you have, boilers that come under almost all these laws, and the resulting confusion may be something stupendous and must be taken care of in the price we make to the consumer on the boilers.

We have established now, through the effort of the steel manufacturers, a standard specification on steel, and by common consent we have established the efficiency of certain seams, and also a certain strength that can be allowed per inch of area on braces and stay bolts, so that it does not seem a far cry to get a definite specification on a boiler itself.

Problems to Be Solved

One problem that will confront us will be the variation in tensile strength which is standard with mills. A variation of from 56,000 to 62,000 lb. in tensile strength would

make a considerable difference in the thickness of a boiler. If one of us should figure on 56,000 and another on 62,000, necessarily one would be figuring on a thicker or thinner plate than the other. In a common specification it would be necessary to specify the material in the braces and working stress in pounds. Now it varies from 6000 to 8000. Unquestionably, all holes should be drilled from the solid, or punched $\frac{1}{4}$ in. small and reamed to size; that there should be at least a full quarter inch of reaming.

In Ohio, Detroit and Manila there is a uniformity in the number of braces above the tubes; there are no particular specifications as to tubes or the material in the tubes, but in almost all the specifications the tube hole must be either cut from the solid or punched $\frac{1}{4}$ in. small and reamed to size.

The butt strapped seam is now demanded on all boilers due to the fact that it has been proved to the satisfaction of many people that lap seams are a menace to the integrity of the boiler, and many boiler explosions have been attributed to lap seams in the longitudinal section. Some laws limit the thickness of plate to $\frac{1}{2}$ in. and the force limit the pressure on horizontal tubular boilers.

We should strive in our uniform specification for a standard specification on material, so as to remove the necessity of carrying material in stock of two different physical and chemical qualities.

If this organization, through its various connections, can establish in each legislative assembly the necessity of uniform treatment of this subject, so that when laws of this kind are coming up they can bring to bear the influence of all interested people, as they easily can, by keeping in touch with the situation of the laws to be enacted, we can accomplish our purpose. Of course, it will be attended with much hard work and honest effort, but, now that we have at least reached an agreement that a standard specification is necessary, the greatest obstacle that has hitherto prevented us from having it heretofore, has been removed.

A Uniform Steel Specification a Simple Matter

A uniform steel specification seems to be very easily accomplished. By comparison with three mills, we find that there appears to be no necessity for special requirements such as Massachusetts and Ohio. We find that the law requiring special steel there is practically no difference between fire box and flange steel on these special requirements, except as to the matter of the brand. Eighty-five per cent. of flange steel coming from one mill has the qualifications and could be stamped as fire box, and another mill 93 per cent. of all flange steel could be stamped fire box. That is, both steels have the same chemical and physical qualities, and they are changed from flange to fire box, or from fire box to flange, by a stamp which is put on, the only difference being that the charge \$2 a ton extra for using a stamp marked "Fire Box" as against a stamp that would brand it as "Flange Steel." We would suggest that what is really required is more stamps on the plate showing mill test and less stamps showing the brand. If the mill test stamps are put on the plate, that they can be observed by the inspector, he can then have the full record of the plate from this heat and mill stamp. He can then tell what the tensile strength is, and not assume it. As a matter of fact, all inspectors under State laws will assume the minimum tensile strength the law permits, unless they have access to the physical test made by the mill. There ought to be uniformity regarding this point.

In these specifications, particularly of Massachusetts and Ohio, fire box steel is specified in the shell and in the heads. This, in our estimation, is an error. If there is a difference in the steel, and if the fire box is supposed to be of a better quality, attributable to increased ductility, which would make it a better steel for flanging, the law is exactly contrary to the best practice. The best steel should be used for flanging, and therefore the specifications and the law, should be according to our ideas, flange steel in the shell and fire box steel in the heads. But, as before stated, as a matter of fact there is no difference in the quality of the steel. Hence, we feel that the Massachusetts, Ohio and Detroit inspection laws calling for fire box steel in the shell are clearly in error, militating against people who buy under those laws.

We doubt very much whether any State law would

good, if it were tested, that specified a certain brand on the plate. We believe that any court would decide that if the plate came up to the physical and chemical test required by the law, it would make no difference what the plate was branded, and it might not be a bad idea for this organization to designate some manufacturer to ship a boiler into one of these States and have it branded "Flange Steel" and make a test case; of course, with the hypothesis that the flange steel passed the physical and chemical tests to entitle it to a brand of "Fire Box."

The boilers that the company I represent manufacture and whose specifications have been submitted, would pass any of the American laws except such laws as call for fire box steel. To a concern building an occasional boiler, and that does not have to carry material and finished boilers in stock, the difference in price of \$2 a ton would not be material, but it is important with one that carries a large amount of stock and a large amount of finished boilers and uses from 10,000 to 12,000 tons of steel a year. It can be readily appreciated that it would cost from \$20,000 to \$24,000 a year to use flange and fire box steel, and it would necessitate carrying, in order to supply the trade promptly, double the amount of stock, both in the flange plate and in the finished boiler; all of which would have to be made up in the price charged to the consumer for the boiler.

Along the line of conservation and economy, would it not be wise to adopt flange steel for boilers throughout, for, as previously stated in this paper, there is no difference between flange and fire box steel from the majority of mills except the stamp? It is a direct discrimination against purchasers in various States where they have the law of fire box steel, causing them to pay more money for their boilers.

In other words, is it not a fact that the people who reside in States that have not yet passed these laws will get a better boiler, or as good a boiler at least, for the same money, as a resident of a State who buys under the law providing for special steel? The man in the adjoining State would get steel of the same physical requirements and the same chemical analysis and he would get it for less money.

Again. Some States require brackets on the boiler, while some States require the boiler to be suspended from a gallows frame. Will a gallows frame support a boiler any better in Indiana than it would in Massachusetts or will a boiler with brackets on stand any better in Massachusetts than it will stand in Indiana? All these things cause extra expense to the manufacturer, making an extra price to the consumer, for which he gets no adequate return.

Recommendations for Specifications

In conclusion, we would recommend:

That boilers be built on a factor of safety of five, of uniform steel, and that this specification cover flange steel.

That the steel be marked with the heat number instead of the brand, and that it be made of minimum tensile strength of 60,000 lb., and be subject to the bending and quenching test, and that it have phosphorus not to exceed 0.03 per cent., sulphur not to exceed 0.04, and manganese 0.50.

That weldless crowfoot type braces be used, of the same quality of steel as the plate, that they be figured on a basis of 7500 lb. per sq. in. of section in the brace, and that on this basis no brace be used containing more than 1.28 in. area of section.

That through braces, either above or below the tubes be weldless and be figured on 7500 lb. per sq. in. of area.

That all seams be butt strapped with inside and outside covering strips.

That all manholes be 11 x 15 in.

That no plates be used in a tubular boiler thicker than 3/4 in.

That all holes for rivets be punched 1/4 in. small and reamed to size.

That all flue holes be punched 1/2 in. small and reamed to size.

That no cast iron be used in connection with the boiler, either for reinforcement or any other purpose.

That all plates be beveled on a planer instead of beared on a bevel shear. (A demonstration on a 9/16

in. plate shows that it is impossible to do a good job on a splitting shear, and that the same objection that exists to a punched hole holds good in the use of a splitting shear on thick plate; that is, that the metal is distorted by use of a splitting shear.)

That water column connections all be 1 1/4 in.

I would recommend, also, that a committee be appointed with power to act to bring together a committee of boiler makers, steel manufacturers, State and city officials (whether they be inspectors or chairmen of the boards), a committee from the American Society of Mechanical Engineers, and a representative from the leading boiler insurance inspection companies; and that the meetings of this committee so appointed shall be open to the general public and that this be done within the next 60 days, in order that rules and regulations may be adopted that can be made uniform for the construction of tubular boilers.

I would recommend that the utmost publicity be given to the effort of manufacturers to procure a standard specification in all the trade and mechanical papers throughout the United States.

Uniform Building Specifications

Quite a number of building exchanges have made attempts toward establishing a uniform system of specifications for different kinds of buildings. The Builders' & Traders' Exchange of Cincinnati, Ohio, is now making a special effort along this line. While residence construction is more at stake in this particular fight, manufacturing buildings also represent a problem that calls for a more thorough co-operation between the architect and the builder.

Many contractors complain that plans which they are compelled to follow are, in a number of instances, drawn up by men who have had no actual building experience. Frequently an architect permits his draftsmen to handle all minor details, and if none of them happens to be a practical man with experience in the building line, a large number of mistakes are made that sometimes prove costly after the building is erected. A recent instance may be cited where a contractor was compelled to follow foundation plans for a large manufacturing plant. Although against his better judgment, he took a chance and erected the building. Soon after it was finished it had to be shored up, involving a large expense that the contractor was eventually forced to stand.

The natural consequence of a few mistakes of this kind is the effort on the part of building contractors, who do not draw up their own plans, to have a more thorough understanding with the designing architects. An effort toward a uniform system of specifications, covering all kinds of buildings, appears to deserve the support of the architect, contractor and owner. If such a plan is feasible, its general adoption would doubtless be the means of a great saving to all of the three parties in interest.

The whole controversy centers on theoretical and actual knowledge in preparing plans for a building. The many different types of manufacturing plants now being constructed would seem to be in the way of the system advocated, but the plan is well worth consideration.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, is preparing to take advantage of the Ohio workmen's compensation act, whereby, through the payment of an established premium to the State, the commonwealth assumes responsibility for the payment of all death and injury claims against the corporation. In the event that this is done it will mean the payment of a premium of \$80,000 to the State by the Youngstown company for the protection of approximately 8000 men during the premium period. At a recent session of the Legislature an act was passed making the compensation feature compulsory after the first of the coming year. Until that time it is optional with employers whether or not they avail themselves of the protection afforded by the State.

On the application of some of the stockholders, the Auto Parts & Motor Company, Sandusky, Ohio, has been placed in the hands of W. M. Harsh and Daniel M. Storms as receivers.

The Case of the Talbot Tilting Furnace

The Charge Made That Too Little Study
Has Been Given to Possible Improvements

The case of the Talbot tilting open-hearth steel-making furnace, with particular reference to its development in design and yet the seeming lack of wide consideration on the part of designers, has been brought up to date by Benjamin Talbot, Middlesbrough, England, in a paper read before the recent meeting of the Iron and Steel Institute. The paper deals largely with the continuous process and makes some interesting observations on steel works procedure. It is some fifteen years since Mr. Talbot designed the first tilting furnace erected by him in America. Although tilting furnaces were not unknown at that date, and had indeed been condemned, the furnace erected under his supervision at Pencoyd about the year 1898 embraced several features new at that time. It was in this furnace, rated at 75 tons, that the first trials of the continuous process were carried out. Although at that time the furnace gave good results, the furnaces which have been erected in recent years under his supervision are in many points, he emphasizes, a very great improvement on his original design.

Attitude of Designers Toward the Tilting Furnace

In studying the design of other furnaces, more especially some of those erected in America, Mr. Talbot expresses surprise at the seeming want of initiative on the part of modern furnace designers in not studying the possibility of improvements in the design of the tilting type of furnace. He cannot understand, he says, the attitude of mind of these engineers unless there is, as he believes, a strong prejudice against this type of furnace. The only alternative that occurs to him to account for their attitude is that they imagine finality has been reached in the design of these furnaces, which, he suggests, would be an absurd position to take up.

This attitude of mind he finds the more difficult to understand, as several of the large corporations in America have such wide resources and special facilities for experimental work, that they could readily build one or two of these large tilting furnaces in the same works as their ordinary fixed furnaces, whereby they would be enabled to work under exactly similar conditions of practice and materials as their fixed furnace plant is worked under.

Main Points of Change in Design

The Pencoyd furnace was furnished with a block inside the tilting section proper, and in this detail it resembles, in every respect, he holds, the arrangement found in the ordinary fixed furnace. After trying in various ways to improve the life of the block with more or less success, a radical departure in water-cooling was finally decided upon, and for some time now the furnaces have been built with no block whatever in the tilting section of the furnace itself, the space formerly occupied by the block being now a large central opening in which the incoming air and gas meet and combustion takes place. In no other respect, he asserts, has any change of any moment been made in the design of the furnaces as now put down as against those first put down at the Frodingham Company's works, except, of course, that the more recent furnaces are of a capacity of 200 to 250 tons, as against the original 75-ton furnace at Pencoyd, and the 100-ton furnace at Frodingham.

To show in what direction others have sought to improve the design of the fixed furnace, the author submitted drawings of furnaces with the Knox cooling devices, widely used in the United States; and the Blair cooling devices, with the further idea of a movable slag chamber. These designs, he says, show a most expensive form of fixed furnace, although they constitute a distinct advance. If they be carried out, the cost per ton of output with a 60 to 80-ton fixed furnace so designed against a 200-ton tilting furnace, working with the same quality of liquid metal and taking out the same weight of cast per heat, will be less in the case of the tilting furnace, he claims, as the output from the latter will be larger when working under the same conditions as the fixed furnace.

First Cost of Fixed and Tilting Furnaces

Again, when comparing the tilting furnace with the fixed furnace, especially the large tilting furnaces now

commonly used, he emphasizes that it must be remembered that the floor space occupied is far less in the case of the tilting furnace per ton of output obtained. This leads to an economy in the cost of the building which houses the furnaces. Looking at it from every point of view, the author contends that such expensive fixed furnaces are being built, provided with every appliance considered essential in a well-equipped tilting furnace plant, such as charging cranes, overhead casting cranes, ample floor space, arrangements for casting on cars, etc., that the 200-ton tilting furnace will turn out to be a cheaper plant to erect for large tonnage when regard is had to the quantity of output obtained. In this connection also it is well to remember, he suggests, that it is really only the tilting section in a tilting furnace plant that varies essentially from the fixed furnace plant.

Modern fixed furnaces rated as of 60 to 80 tons capacity are now being erected in the United States in which the chambers, he finds, are larger than those used on the large 200-ton Talbot tilting furnaces, and consequently the cost, apart from the tilting section, cannot be less than that necessary for putting in a large tilting furnace. Again, on analyzing the cost of the various items making up the tilting section, he mentions that many of them are common to either design; for example, the water-cooled doors, the door framings, cheek pieces, etc., and in modern fixed furnaces the water-cooling devices, are common to both types. The tilting section, apart from the necessary brick work, is, he adds, quite a small item in the cost of a complete tilting furnace plant, capable of, say, an output of 1200 to 1400 tons of finished steel per week from each tilting furnace.

The Uses of the Talbot Process

Mr. Talbot admits that when very silicious molten pig iron has to be treated, which is not so suitable for direct use in the steel-making furnace, there is much to be said for the use of the tilting furnace as a preliminary refiner. On the other hand, he is of opinion that with a good quality of pig metal, low in silicon and sulphur, much of the pig iron that is passed through so-called mixers would be very much better retained there and made into steel with one set of men. If the blast-furnace manager really cannot make a pig iron sufficiently low in sulphur to treat economically in the steel furnace without an unduly high percentage of silicon, then perhaps the production of a fairly high silicon iron in the blast-furnace, a desilicization of this iron in a preliminary tilting furnace, and its subsequent treatment in a second steel-melting furnace, is the more economical method of procedure; but the question is a complex one, and the local conditions have to be taken into full consideration. It is the custom in some works, especially in the one the author has in his mind, to treat the metal in the large preliminary refining furnace, and then to pass it along to a basic Bessemer plant, but of this practice the author prefers not to speak.

Finally, in discussing the uses of the tilting furnace, Mr. Talbot holds that without the tilting furnace the continuous process would never have been a commercial success, and the millions of tons now being made annually would not have been possible. The ease with which molten pig iron can be poured in, molten steel cast out in any desired quantity, and practically free from all slag, and the facility with which slag can be removed, free from all steel, renders this type of furnace indispensable, he asserts, for carrying out the continuous process. By its use any grade of pig iron (within the ordinary limits of silicon), with or without scrap, he continues, can be successfully converted into steel, and any grade of steel from the very softest to the hardest rail quality can be successfully made. From a single furnace of 150 to 200 tons capacity, with direct molten pig iron only, outputs of 1200 to 1500 tons per week of steel ingots are being obtained, and with desilicized metal from a preliminary refining furnace, 1800 to 2000 tons per week; and if blown metal be used instead of pig iron, outputs up to 4000 tons per week have been obtained from one furnace.

Some Operating Advantages

An objection which has been brought forward against the use of large tilting furnaces of 200 ton capacity has been that the objector does not see why 200 tons of steel should be got ready for tapping, and only say 60 to 80 tons taken out. To meet this objection Mr. Talbot says he has

generally asked in reply, does not the fact that you have this tapping temperature, that you have this purity of composition of metal in the bath, and that you have a highly treated basic slag capable of doing work, all tend to quicken the purification of the incoming impure metal as well as to dilute the impurities in it, so that the continuous bath expedites the early part of the charge and thus more than outbalances any disadvantage that may accrue from retaining a part of the finished bath in reserve?

Another advantage Mr. Talbot claims for the continuous bath is that the melter can take off slag at any time that may suit his convenience, and when steels of great variation in composition are being made, such as from a steel with 0.05 per cent. carbon to one of 0.70 per cent. carbon, this is, he considers, a very important point. The manipulation of the slag in fixed furnaces when working liquid iron is admittedly not under such good control as when tilting furnaces are used. At one large continental works, he says, a fixed furnace is tapped twice to obtain one heat of finished steel. This method of work must be due, he believes, to the desire to get rid of the large volume of slag which is formed, unless there is some other advantage of which he is ignorant. The furnace is emptied of metal and slag, the hole is stopped, and the metal is returned again to the furnace from the casting ladle. Oxide and lime are added to the furnace before the metal is returned, but they could be added, he holds, with greater advantage to the surface of the metal if a tilting furnace were employed, and the slag only poured off leaving the metal in the furnace, where it would not be subjected to the cooling action of the atmosphere. Large basic additions chill the furnace, and in heating up again, accretions form at times on the bottom which grow and cause it to get out of shape.

Mr. Talbot gave tables of the so-called rated capacities and dimensions of various furnaces, to show that there is absolutely no fixed ratio between the rated capacity, the hearth areas and the cubic areas of the regenerator chambers, except for furnaces of 100 tons capacity and over, all tilting furnaces using the Talbot process, in which there is a fair agreement.

Oxygen in Blast-Furnace Practice*

A Large Belgian Company's Experiments
—Reducing Gas Free from Nitrogen

BY GUSTAVE TRASENSTER

For some time past the Ougrée-Marihay Company has been carrying out experiments on the use of oxygen in metallurgy, with special reference to blast-furnace practice. In order to obtain the oxygen required the company has had recourse to the air-liquefaction process, deeming that, in the present state of the science, this was the only process which could be regarded as capable of yielding, in commercial quantities and sufficiently cheaply, the large amounts of oxygen which it was necessary to employ. The system adopted at Ougrée for the liquefaction of air and its separation into its elements is that of Georges Claude, of Paris.

The liquid air having been obtained, advantage is taken in the process described of the difference between the boiling points of liquid oxygen and liquid nitrogen to separate the two elements. The boiling point of oxygen is -180°C , and that of nitrogen -195°C . This separation, however, necessitates boiling the mixture, and this is effected very easily in a vaporizer; the gases resulting from the ebullition rising in a receiver, the sides of which are sprayed by intensely cold liquids—mixtures of more or less liquid oxygen and nitrogen—which effect condensation and, as a result, the almost complete separation of the oxygen in the ascending gases. The apparatus allows of pure gaseous oxygen being obtained on the one hand, and, on the other, equally pure nitrogen containing at most a few hundredths of oxygen.

The Oxygen Plant at Ougrée

The Ougrée plant is capable of making 600 cu. m. of oxygen per hour. It is composed of three absolutely similar liquid air units, each unit yielding 200 cu. m. of oxygen hourly. A unit consists of:

1. A compressor, capable of drawing in 1200 cu. m. of air per hr., and of compressing it at a pressure of 15 atmospheres. This compressor is belt-driven from a dynamo.

2. A liquid-air machine and tower, containing all the fittings and appliances necessary for the liquefaction and separation of the air into oxygen and nitrogen.

3. Two decarbonizing towers. It is of prime necessity that the air drawn in by the compressors and sent into the liquid-air machine should have every trace of carbon dioxide it contains removed. With this object the air is made to pass through two towers containing brick chequer work, which is sprinkled with a solution containing soda.

4. A battery of desiccators intended to remove any moisture contained in the air. This battery is interpolated between the compressors and the liquid-air machine, and therefore receives the air under pressure. The desiccation is effected by means of calcium chloride.

The operations are of the simplest description, and the staff is very small. The manufacture of oxygen from liquid air has become a thoroughly practical and business operation; and because of certain improvements with which the Ougrée machinery is equipped, it has been possible to secure continuous working.

Experiments with Enriched Blast and with Pure Oxygen

Unfortunately no definite results can as yet be given as to the experiments it is intended to make. Some months ago a preliminary trial was carried out, but its duration was too short to justify conclusions being drawn. It will shortly be resumed. The experiments which it is proposed to carry out relate to two distinct problems:

1. The first series of experiments will consist simply and solely of enriching the blast delivered to one of the company's existing blast furnaces, by oxygen—that is to say, mixing with the blast for this blast furnace the 600 cu. m. of oxygen available. The percentage of oxygen in the blast will be raised by these means from 20.8 to about 23 per cent. The problem to be solved is whether this degree of enrichment is sufficient to cause the anticipated phenomena to manifest themselves sufficiently distinctly.

2. Other experiments will be carried out in a small blast furnace which has been built, and in which working will be conducted with very high percentages of oxygen, and even with pure oxygen. In the latter instance, should the need of so doing be felt, recourse will be had to the Oscar Loiseau process, and the intense heat will be reduced by introducing some of the waste gases at the hearth, so that, in any case, the reducing atmosphere in the furnace will be entirely free from nitrogen.

With regard to the results that may be expected, but without too rigidly anticipating effects or entering into theoretical speculations, it may be said that a reduced consumption of fuel, greater speed in the working of the furnace, and increased purity in the products may be looked for. So far as the power consumption in the manufacture of oxygen is concerned, the more highly the blast is super-oxygenized the smaller will be the volume it will be necessary to heat. On the other hand, although only actual experiment can decide the point, it may be necessary to heat the blast to a less degree. There would, therefore, be a certain amount of waste gas available. If it be found possible to work with pure oxygen it will not be necessary to heat the blast, in which case the gases available will supply considerably more motive power than will be required for the production of the oxygen. To this must be added that enormous quantities of nitrogen will be available, the utilization of which will more than defray the expenses involved in the manufacture of the oxygen.

[Patents were granted in the United States a few years ago to J. E. Johnson, Jr., covering a process of supplying blast containing an excess of oxygen and also the elimination of nitrogen. An article on the subject appeared in *The Iron Age* of February 11, 1909.—EDITOR.]

Cast copper of high electric conductivity and mechanically sound can now be produced successfully by the use of boron which has a great affinity for oxygen, nitrogen and oxygen-containing gases. Cast copper is rapidly replacing forged copper in many of the electrical arts.

*A paper read at the Brussels meeting of the Iron and Steel Institute, September 1 to 4, 1913.

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New Apparatus for Gas Cleaning

Considerable space is given in this issue to an account of a method of removing dust and other particles from gaseous products of combustion. The system appears notably successful after some months of trial and promises a broad field of usefulness owing to its capability of handling large volumes without itself taking on large proportions. In fact, at this writing it is being tried near Pittsburgh for blast furnace gas purification and there will be no little interest in the results. The fundamental ideas are not new, and it will doubtless be surprising to other experimenters in the field to find how the combined use of a wet deflecting plate, a short water curtain and a tank of water, swept against and across its surface by the gases, has so well solved a vexing problem. As a cleaner the apparatus is a catcher rather than a washer, depending mostly on projecting the gases against the water in the tank, driving the particles into the water at an estimated speed of 50 ft. per second. One of the secrets of its success is apparently the development of the high velocity by the constriction of the gases at the point immediately above water (itself more than shallow in depth, giving a sufficient quantity to hold the particles) and a short enough region of high velocity not to interfere seriously with the draft. The water consumption should not be inordinately high, so that what cooling of the gases occurs would not be at the expense of much added water vapor. The system would appear to have an advantage in comparison with a lately favored method of dry cleaning, both in respect to operating cost and in the necessity anyway, in the case of the dry cleaning, of pre-cooling the gases.

The Greater Handicap of Wrought Iron

In November, 1911, 4-in. steel billets were sold, presumably at no loss to the maker, at less than \$6 per ton above the cost of gray forge pig iron delivered to mills in the Pittsburgh and Valley districts. For two months past the United Sons of Vulcan have been holding out for a scale involving \$7 per ton for the mere act of puddling. In the light of these facts the wonder is not that the production of wrought iron has declined in the past half dozen years; the wonder is that the industry has survived at all.

The "passing of the puddler" as the most important workman in the iron industry occurred in the early years of the eighteen-ninety decade. It was a new iron industry which sprang up, reaching its culmination in point of production in the year 1907. Referring to the earlier iron industry, the year 1890 marked its culmination. The displacement of wrought iron by Bessemer steel occurred in two periods. The first was that in which hard Bessemer steel displaced iron as rail material, and occurred in the decade of the eighteen-seventies; in 1876 more iron than steel rails were rolled and in 1877 more steel than iron rails, the latter disappearing very rapidly in subsequent years. The advent of soft steel in large tonnages occurred much later, for in 1890 the tonnage of steel rails produced exceeded that of all other rolled steel combined, while in subsequent years the production of mild steel, as contrasted with rail steel, rapidly increased. While there is no absolute statistical confirmation, there is

practically no doubt that the production of wrought iron reached its maximum in 1890. The number of puddling furnaces, according to Mr. Swank's compilations, increased from 4914 in November, 1889, to 5120 in January, 1892, which we think indicates belated construction of puddling furnaces at a time when older furnaces had become idle, never to run again, as the event proved.

The competition of mild steel with wrought iron in those early days was one of price, strength and finish. There was no very serious question raised as to durability, in the direction of resisting either repeated shocks or corrosive influences, and this was partly due to the fact that there was no general knowledge upon which to base any contentions of this sort. In finish the mild steel was superior to wrought iron, and lent itself better to use in machinery which required the blank to be accurate to section. In tensile strength it somewhat exceeded wrought iron, while as regards beams and channels the steel furnished a much stronger member, irrespective of the element of tensile strength, in that the steel beam or channel could be rolled with much thinner web, producing a better distribution of metal by increasing the radius of gyration for the same sectional area. In price the mild steel eventually passed wrought iron.

In less than a decade after 1890, the year of maximum rolled-iron production, this material was wholly relegated to the background, and was made at all chiefly because in various districts local scrap could be used to advantage and was obtainable at an extremely low price, even compared with the low prices ruling for pig iron.

Later there came a revival in iron manufacture, not because iron was cheaper than soft steel, but because a very considerable number of buyers believed it to be better. The idea that iron resisted corrosion better than steel applied in particular to pipe, and this belief appears to have been strongest in 1905, for in that year occurred the maximum production of iron skelp, there having been such a decline since then that the 1912 production of iron skelp was 28 per cent. less than in 1905. For two years after 1905 the production of rolled iron, so-called, increased, the maximum production of all rolled iron, including skelp, being reached in 1907 at 2,200,086 tons, the corresponding production in 1912 having been 1,637,582 tons.

An important distinction needs to be drawn between the wrought iron produced in different districts. In some districts forge pig iron is used to a considerable extent, as well as selected grades of old material, while in other districts no pig iron or corresponding description of cast iron is used, the scrap being such cheap material as is available. Hence there is a great difference in the character of the "wrought iron" produced. In Pittsburgh and the Valleys the iron usually commands a heavy premium over soft steel, while in most other districts the "wrought iron" is at a discount.

That a good grade of wrought iron cannot possibly compete with mild steel, unless it has superlative advantages in use, was amply proved by the two simple statements made at the outset, that a body of puddlers is demanding a rate of \$7 a ton for the mere act of converting pig iron into a puddle ball, while perfect 4-in. billets have lately sold at a less spread than this over the cost of that same grade of pig iron. Were there no cost whatever apart from the puddler's pay,

the iron would be at a disadvantage. The fact is that the manufacturer must find, maintain and fuel the puddling furnace, and must then convert the puddle ball into material suitable for the merchant mill, all of which involves great expense, and much greater than in similar processes involving steel. Before the actual puddling operation the iron must be melted in the puddling furnace, and that in small units of a few hundred pounds, whereas in the basic open-hearth steel process the melting of iron in large aggregates, 50 to 75 tons or more, is regarded as expensive and is being avoided more and more by the use of direct blast furnace metal. Again, the rolling of iron is very much more expensive than the rolling of steel, involving small mills with much skilled labor and the production of much scrap. Thus at every point the production of rolled iron of quality is very much more expensive than the production of rolled steel. It should be noted that in various isolated districts in which rolled iron—chiefly merchant bars—is produced there is no puddling, the treatment being of wrought scrap, obtainable at low prices relative to the pig iron which is the basis of the steel industry.

It is far from adequate to say that the puddler has been putting a rope around his neck. Given a very cheap puddling rate, the production of wrought iron would still be very expensive; but a comparison of the bare puddling rate with the cost of converting pig iron into steel billets strikingly sets out the growing handicap of wrought-iron manufacture.

Safe-Guarding the Pay Roll

In a great many manufacturing plants, no check exists on the distribution of pay envelopes to give complete assurance that each employee gets his own. The workmen pass in line and each gives his name and number, or perhaps either name or number only, and the envelope is handed to him by the pay clerk without question. Where a working force is small, the danger of dishonest practice need hardly be considered. But in large establishments the pay clerk cannot be presumed to know all the men by name. Another important matter is the increasing proportion of alien labor, as with certain nationalities the identification of the individual is often difficult. Recently in a works employing some 500 men various employees failed to receive their envelopes because someone else had previously given the name and number and obtained the money without question. In each instance, however, it happened that the man defrauded was of such excellent reputation that his word was not questioned and the company made the double payment. Yet, the workman placed in such a position has probably been uncomfortable, fearing that he had been brought under suspicion.

To avoid a recurrence of such practices, the company has adopted a system which removes all doubt as to the identity of the payee. Each pay day, before the hour of paying off arrives, the foremen are given cards for distribution to their men. These are dated, and each has the name and number of a workman. He signs his name below the statement "I hereby acknowledge receipt of wages due this day," and below the signature is the statement "this receipt must be delivered to paymaster before wages will be paid." The pay envelope is given in exchange for this receipt and thus the possibility of fraud is eliminated.

Automobile Consumption of Steel

The manufacture of automobiles is increasing so rapidly that its demands upon the steel industry a few years hence promise to become highly important. If the industry did not consume a million tons of iron and steel in the season just closed, it will in all probability do so next season. Long since the leading automobile shops passed the hundred thousand ton mark in the consumption of steel sheets alone.

Apart from top, upholstery and tires the automobile is destined to become an exclusively metal product, easily the chief metal, of course, being iron. Wood early yielded to steel for bodies and frames, and remains only in the wheels and in the form of a few boards used at various points. The employment of these boards is obviously merely a temporary convenience. The maker may not know, for instance, precisely what appurtenances he may desire to locate on the dash, it being apparently the effort of some designers to gather together as many such appurtenances as possible. Inspection readily suggests the idea that all the boards now entering into an automobile exist for the purpose of fastening metal thereto, a poor principle which will naturally yield to more fixed design and the employment of metal. As to wheels, it is already admitted that the supply of suitable timber cannot long meet the requirements and it is practically a foregone conclusion that metal will supplant wood in the wheel. Apart from the limited supply of wood there are obvious advantages in steel. One is that at high speeds tires become unduly heated, and a steel construction would furnish a radiator for the heat. Another is that a steel wheel is less likely to develop and carry unobserved weaknesses than a wooden wheel built up of many parts held together by somewhat uncertain means. It does not follow that a wire wheel will eventually secure general adoption. We may readily see an entirely new form of disk construction, perhaps involving new principles in rolling, to distribute the metal properly in the disks. Many millions of tons of iron and steel had been rolled before any form of rolling was developed beyond that of passing material between plain or grooved rolls with parallel axes. Then came the rolling of tubes by piercing a billet, the rolling of a complete wheel with web and flange, and other forms of special rolling. Much more can doubtless be accomplished in rolling operations other than that of producing a long piece with uniform cross section.

The automobile of the near future is therefore likely to be almost entirely of iron and steel, consuming from half a ton to two tons or more per vehicle.

In a bulletin just issued, it is stated that the membership of the American Society for Testing Materials has been increased by 46 since the recent meeting at Atlantic City and is now 1620. The Proceedings of the Sixth Congress of the International Association for Testing Materials, held in New York in September, 1912, will be issued to American members in the form of two volumes of about 1100 pages each some time in October.

The Underwood-Simmons tariff bill passed the United States Senate on Tuesday, September 9, by a vote of 44 to 37. The majority in favor of the bill was larger than expected. Republican Senators Poindexter of Washington and La Follette of Wisconsin voted in favor of the bill, and Democratic Senators Ransdell and Thornton of Louisiana voted against it.

Copper-Bearing Steel and Corrosion

An Argument Against the Rust Resistance Claimed for Cupriferous Sheets

Dr. Allerton S. Cushman, director of the Institute of Industrial Research, Washington, D. C., has written a pamphlet of 47 pages with the title "Pure Iron vs. Copper Bearing Steel." In his foreword the author makes this statement of the position he is assailing:

It is claimed on the basis of certain atmospheric exposure tests of light gauge sheet metal that if a very small quantity of copper is contained in ordinary Bessemer or open-hearth steel such a metal will be superior in rust-resisting quality to any other commercial iron or steel now on the market.

A dozen pages of introduction are given up to a statement of Dr. Cushman's work, when connected with the Department of Agriculture, in the investigation of the rapid corrosion of fence wire. His investigations and his publications concerning them gave prominence to the statement that manganese is, at least in part, the cause of corrosion. He urged the production of steel low in manganese as a corrective and at the same time encouraged the manufacture of commercially pure iron in the open-hearth furnace.

Exposure Tests of Coppered Steel Sheets

The main portion of the pamphlet takes up the use of copper as a preservative for steel, coming early to the consideration of a paper read by D. M. Buck at the annual meeting of the American Chemical Society at Milwaukee, March 25, 1913, and published in *The Iron Age* of April 17, page 931. Mr. Buck's paper gave the results of a number of outdoor exposure tests of light gauge sheets rolled from experimental ingots, ordinary Bessemer and basic open-hearth steels, to which about 0.25 per cent. of copper had been added in the process of manufacture. These sheets were shown to have outlasted ordinary steel sheets and also lasted better than sheets of "pure commercial iron" in which the carbon, manganese and sulphur were each reduced to 0.03 per cent. or less. Dr. Cushman quotes Mr. Buck's summary statement as follows:

Copper bearing steels resist the atmosphere from one and one-half to two times as well as the normal steels without copper, and there is little or no difference in the average between a copper content of 0.15 and 0.30 per cent.

The pamphlet says that as 0.15 per cent. of copper means 3 lb., or 45 cents worth, in a ton of steel, any consumer would gladly pay this difference for material lasting twice as long, according to Mr. Buck's claim, "so that if Mr. Buck has stated a general fact, we have to deal with a discovery of very great economic importance."

Steel Containing Copper Not New

Dr. Cushman refers to statements made some years ago by Prof. H. M. Howe and H. H. Campbell as to the manufacture of steel with copper content, showing that coppered steel is no new discovery. The quotation from Campbell refers to his experience in the making of "millions of tons of cupriferous steel." The author considers it remarkable that if such steels possessed extraordinary resistance to corrosion that point should have escaped the notice of Howe, Campbell and other metallurgists. The existence of copper in some ancient irons is also referred to, including three specimens—a rude chisel, a nail and a bill hook—described by Sir Robert Hadfield in a paper before the Iron and Steel Institute. All specimens were exceptionally pure wrought iron. The nail contained 0.12 per cent. copper, the chisel 0.09 per cent. and the bill hook about 0.01 per cent. Hadfield said that if the copper gave added resistance to corrosion the nail should have shown less corrosion than the others, whereas they were practically alike. He therefore concluded that the addition of copper does not enable iron and steel to resist corrosion.

Tests Called "Accelerated"

Dr. Cushman criticises at some length the method adopted by Mr. Buck in the manufacture of the sheets containing copper, particularly the addition of the copper in the ingot mold instead of in the furnace; also the short period of nine months in which the sheets were exposed, calling this "an accelerated test just as certainly and surely

as the acid test is subject to the same criticism." He also criticises the gauge of the sheets, saying:

Purchasers seldom if ever expect to put 27 gauge material out to weather exposure without some form of protective coating. * * * A sheet of metal 1/16 in. in thickness will last, under a given set of exposure conditions much more than twice as long before complete failure occurs as a similar sheet 1/32 in. in thickness. * * * It is fair to insist that if the superiority of coppered metal is to be demonstrated the test should be made on material of all the competing kinds bought in the open market, and if the lighter gauges are selected in order to accelerate the failure, a sufficient number of specimens should be included to prevent any hit or miss calculations based on a few sheets which might or might not be representative of the general run of the types of metal under test.

The author turns to the endorsement of Mr. Buck's claims for steel containing copper given by Prof. W. H. Walker and refers to the fact that the latter, "who has always heretofore been one of the leading exponents of the electrolytic theory of corrosion is now inclined to cast a doubt upon its validity." Professor Walker had said, referring to the iron of the old chain bridge at Newburyport, Mass., that it has withstood corrosion in a remarkable manner for 98 years and yet it is conspicuous for its heterogeneous structure, while the electrolytic theory asserts that homogeneity in material insures protection. Dr. Cushman says he obtained a ton of the Newburyport links and found them unusually pure; as to manganese and sulphur they were as pure as modern open-hearth irons or purer. Some of them he had rolled down to No. 16 sheets and exposed them to various corrosion tests. Some were "no more resistant to such tests than the general run of modern samples they were compared with. The thinner they were rolled down the more any lack of homogeneity they possessed asserted itself and tended to overcome the advantages of their generally pure nature."

Dr. Cushman's Experiments with Copper in Iron

Concerning his own experiments with iron containing copper the author says:

In 1909 and 1910 the manufacturers of pure iron in the open-hearth furnace were much troubled by the appearance of copper in their product. There was no indication at that time that this accidental copper did any harm to the iron; but since the prime object was to turn out a material of the maximum possible purity, the presence of copper was highly undesirable. In the meantime the appearance of copper to the extent sometimes of from 0.10 to 0.15 per cent. in a product otherwise of unusual purity served to call attention to the importance of studying the effect of copper on the corrosion resistance of the material. At the same time that steps were being taken to eliminate copper to the lowest possible content, say not to exceed 0.03 per cent., a number of experimental heats were undertaken under the writer's supervision, in which copper was deliberately added to the open-hearth heats, so as to produce a series of alloys with a constantly increasing copper content ranging up to as high as 1.5 per cent. of copper. These successive heats were made under as constant conditions as possible, and were then rolled into sheets of sixteen-gauge and put out to weather exposure. The resulting sheets contained approximately the following percentages of copper: 0.03, 0.25, 0.50, 1.00, and 1.50. Some of the test pieces were exposed to the smoky atmosphere of a mill town and some to the purer air of Washington, D. C. These tests have been under constant supervision for three years. In no case yet has the presence of copper in this pure iron base been indicated as beneficial, while in some cases it has clearly appeared to be deleterious, increasing the tendency to a scaly rust formation. Some of these test pieces were "pickled" to a clean surface, neutralized and washed, while others were exposed in the black just as they came from the mills.

If these tests had indicated that copper was beneficial and produced a higher resistance to corrosion, the writer would have been one of the first in the field to announce the fact and advise the manufacturers to bring out a copper-iron alloy to meet conditions where the tendency to corrosion was especially severe. The results of tests did not, however, warrant any such recommendation, but, on the contrary, seemed to indicate that the presence of copper ought to be avoided in these purer irons. It is, of course, possible that while copper is not beneficial to a commercially pure iron, it may improve an ordinary steel, owing to some influence which it may exert on the condition or distribution of the manganese of the steel, or for some other reason. At all events, if Mr. Buck's claims are justified, we are asked to believe that a carefully made coppered steel can be given an excellent quality of corrosion resistance. Whether this is entirely due to the copper or to a combination of circumstances, as already suggested, remains to be seen.

In his concluding pages the author says that while it may be possible that some day a practical and reasonably

cheap iron alloy will be discovered that will possess a high resistance to corrosion he sees no reason at present to deviate from his opinion that extreme purity and great homogeneity are the qualities which should be sought in a durable modern iron. He argues that the consumer has no criterion in the case of a coppered steel specification beyond that of the presence of copper. A content of copper could be made use of to masquerade carelessly made steels in which cheap raw materials had been melted up. He points out that if the use of coppered steel becomes general the open-hearth scrap of the country will become infected with copper.

August Copper Production and Stock

The report of the Copper Producers' Association for August shows the stock of copper on hand September 1, 1913, to be 38,314,037 lb., a decrease of 15,280,908 lb. from that of the previous month. This is the smallest stock for any month since the producers' records were initiated five years ago. The lowest previous record was 44,335,004 lb. on July 1, 1913. The August statement of the association compares as follows with that of the previous month:

Monthly Statement for August.		
	August, pounds	July, pounds
Stock of marketable copper of all kinds on hand at all points in the United States at first of the month	53,594,945	52,904,606
Production of marketable copper in the United States from all domestic and foreign sources in the month	131,632,362	138,074,602
Deliveries of marketable copper in the month:		
For domestic consumption	73,649,801	58,904,192
For export	73,263,469	78,480,071
Total	146,913,270	137,384,263
Stock of marketable copper of all kinds on hand at all points in the United States at the close of the month	38,314,037	53,594,945

The production for August was 131,632,362 lb., a falling off of nearly 7,000,000 lb. from that of the previous month. Domestic deliveries were 14,745,609 lb. over those for July, while foreign deliveries were 5,216,602 lb. less than for the previous month. The large falling off in production for August, together with an increase in total deliveries of 9,529,007 lb. accounts for the unusually low stock on hand September 1. This is a decrease of nearly 85,000,000 lb. from the stock on hand February 1, 1913.

Decrease in Lake Shipments of Iron Ore

The amount of iron ore brought down the lakes from the Lake Superior region in August totalled 7,677,601 gross tons as against 7,760,248 tons in August, 1912. This is a decrease of 82,647 tons and it is the first time this season that each month has not shown an increase. The following table gives the August and season shipments by ports and the corresponding figures for 1912, all in gross tons:

	August 1913	August 1912	To Sept. 1, 1913	To Sept. 1, 1912
Escanaba	964,288	761,717	3,623,632	3,240,011
Marquette	598,861	570,586	2,155,363	2,001,400
Ashland	809,597	761,539	3,073,628	2,865,397
Superior	1,512,425	2,397,535	8,585,838	9,066,190
Duluth	1,957,239	1,690,650	7,891,903	6,076,452
Two Harbors	1,835,191	1,578,221	6,676,708	5,801,762
	7,677,601	7,760,248	32,007,072	29,051,152

The decrease for August was caused by the strike at the Superior docks. Even under these conditions the total season shipments to September 1 show an increase over the same period for 1912 of 2,955,920 tons, or 10.17 per cent. The percentage for Duluth to September 1 was 24.66 as compared with 20.92 per cent. last year, while that of the Great Northern Railroad (Superior Dock) was 25.23 per cent. as against 30.60 per cent. last year, a decrease of nearly 5 per cent.

The United Steel Company, Canton, Ohio, has just placed in operation its new heat-treating plant and expects to have its two new 80-ton open-hearth furnaces, now being erected, ready for operation in November. The company will then have seven open-hearth furnaces. It is well supplied with orders, and its two new bar mills that were started up several weeks ago are running double turn.

S. DIESCHER & SONS.

Mechanical and Civil Engineers,
PITTSBURGH, PA.

The Iron and Metal Markets

Steel Corporation Orders

August Decrease Is 175,848 Tons

A 50,000-Ton Sale of Basic Iron—Low Prices on Lake Superior Charcoal

The heavy rate of steel consumption and the fact that users generally are carrying light stocks and making close connection with the mills are both indicated by the Steel Corporation's statement just issued. Unfilled orders at the end of August were 5,223,508 tons, a falling off of 175,848 tons, or about 75,000 tons less than the expected decrease.

New orders in August were at no less a rate than 33,000 tons a day and cancellations were insignificant. The rate of new business is more surprising in view of the light railroad buying and the policy of buyers to avoid long-time contracts while prices are in process of readjustment.

The smallness of the August reduction in business on the Steel Corporation's books, compared with 408,000 tons in July, 517,000 tons in June and 674,000 tons in May, is in line with the very moderate reductions in prices thus far made. There has been no drastic cutting and it is not likely to come soon.

It does not appear that consumers made any large additions to stock to avoid cancellations on low-priced contracts expiring in the past summer. There were cases, however, of extensions of low-priced deliveries because the mill could not ship at the contract rate. Thus some shipments are still being made of 1.15c. bars.

With all the complaint of its meagerness, railroad buying has not dried up. Bridge orders of the week amounted to 11,000 tons, of which 5500 went to independent works. Rail orders of moderate size keep coming in. The Erie has just bought 4000 tons, the Lehigh Valley and Southern Pacific 2500 tons each, the M. K. & T. 7500 tons, the Nickel Plate 5500 tons, the California, Clinchfield & Ohio 2000 tons and the New York Central and Gulf & Ship Island 1000 tons each.

The Boston & Maine has ordered 1000 cars and 4500 center sills, the whole calling for about 12,000 tons of steel, and the St. Paul has distributed orders for 2500 cars. For the latter and for other car shop work 50,000 tons of steel was recently placed in the Chicago district. Some of the car companies will need work in a few weeks, but lower offers to the railroads have met little response.

The amount of steel construction work in prospect is put at 220,000 tons. At Chicago and in some other districts competition is getting sharper. An interesting export contract of the Steel Corporation is for a department store at Buenos Ayres, 4500 tons, to be built by Harrods Ltd. of London.

The week has brought little change in finished steel prices. Plate mills are bidding more actively for business and 1.40c, Pittsburgh, is commonly done, with indications that on large business it could be shaded. On structural material sales have been made at 1.45c, Pittsburgh, and at \$1 a ton lower. Bars are firmer than plates and shapes.

In the lighter lines wire products have led in activity, but are quieter after the heavy August movement. Sheet mills still find less than enough business to go round.

The situation in semi-finished steel is easier, but no large buying has been started by the recent reductions.

It is evident that the bulk of pig iron buying for

this year has been done. The furnaces have had varying success in the effort to put up prices and a good deal of business has gone through quietly. Southern furnaces are now generally firmer than those in the North, due to recent heavy sales of pipe and basic irons. A good many foundries are ready to buy pig iron for the first quarter and first half of 1914, but they are contesting the advances of 25 and 50 cents the furnaces ask.

In Southern Ohio a steel company has closed for 50,000 tons of basic iron for the first half of 1914, with Central Ohio and Lake furnaces. At Pittsburgh both basic and Bessemer iron are quieter. For the former \$14.50 at Valley furnace is asked, but last sales were at \$14.

Recent liquidation of Lake Superior charcoal iron stocks brought prices down to the coke iron level and below, \$13 at Michigan furnace being done. Some recovery has come in the past week, however.

An impression has at last been made on the \$2.50 Connellsville coke price, as various furnaces have dropped out. A number of sales are reported at \$2.25 at oven and one important producer is offering coke at that figure for 1914.

The cast iron pipe trade is developing keen competition as the supply of work grows less and some Eastern foundries in this line have cut down working time.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

Sept. 10, Sept. 3, Aug. 13, Sept. 11,

Pig Iron, Per Gross Ton:	1913.	1913.	1913.	1912.
Foundry No. 2 X, Philadelphia.	\$15.75	\$15.75	\$15.50	\$16.50
Foundry No. 2, Valley furnace.	14.00	14.00	14.00	14.25
Foundry No. 2 S'th'n, Cin'ti.	14.25	14.25	14.00	15.75
Foundry No. 2, Birmingham, Ala.	11.00	11.00	10.75	12.50
Foundry No. 2, furnace, Chicago*	15.00	15.00	15.00	15.50
Basic, delivered, eastern Pa.	15.00	15.00	15.25	16.50
Basic, Valley furnace	14.00	14.00	14.00	14.25
Bessemer, Pittsburgh	16.65	16.65	16.40	15.90
Malleable Bessemer, Chicago*	15.00	15.00	15.00	15.50
Gray forge, Pittsburgh	14.25	14.25	14.25	14.65
Lake Superior charcoal, Chicago	14.75	15.25	14.50	16.75

Billets, etc., Per Gross Ton:	25.00	25.00	27.00	23.50
Bessemer billets, Pittsburgh	24.00	24.50	27.00	24.00
Open-hearth sheet bars, Pgh.	25.00	25.00	27.50	26.50
Forging billets, Pittsburgh	30.00	30.00	34.00	32.00
Open-hearth billets, Philadelphia	26.00	26.00	28.00	25.90
Wire rods, Pittsburgh	27.50	28.00	28.00	27.00

Old Material, Per Gross Ton:	14.00	14.00	14.00	16.50
Iron rails, Chicago	17.50	17.50	17.50	17.00
Iron rails, Philadelphia	12.75	12.75	12.75	14.25
Carwheels, Chicago	12.50	12.50	12.50	14.25
Carwheels, Philadelphia	12.25	12.25	12.50	14.00
Heavy steel scrap, Pittsburgh	10.25	10.25	10.75	12.25
Heavy steel scrap, Chicago	11.50	11.50	11.50	14.50
Heavy steel scrap, Philadelphia	11.50	11.50	11.50	14.50

Finished Iron and Steel,	Cents.	Cents.	Cents.	Cents.
Per Pound to Large Buyers:				
Bessemer rails, heavy, at mill...	1.25	1.25	1.25	1.25
Iron bars, Philadelphia	1.37 1/2	1.37 1/2	1.42 1/2	1.42 1/2
Iron bars, Pittsburgh	1.55	1.60	1.60	1.50
Iron bars, Chicago	1.40	1.40	1.45	1.45
Steel bars, Pittsburgh	1.40	1.40	1.40	1.30
Steel bars, New York	1.56	1.56	1.56	1.46
Tank plates, Pittsburgh	1.40	1.40	1.45	1.40
Tank plates, New York	1.56	1.56	1.61	1.56
Beams, Pittsburgh	1.40	1.45	1.45	1.35
Beams, New York	1.56	1.61	1.61	1.56
Angles, Pittsburgh	1.40	1.45	1.45	1.35
Angles, New York	1.56	1.61	1.61	1.56
Skelp, grooved steel, Pittsburgh	1.35	1.35	1.45	1.30
Skelp, sheared steel, Pittsburgh	1.45	1.45	1.50	1.35
Steel hoops, Pittsburgh	1.50	1.50	1.50	1.45

Sheets, Nails and Wire,	2.15	2.15	2.25	2.05
Per Pound to Large Buyers:				
Sheets, bla.k. No. 28, Pittsburgh	1.65	1.65	1.65	1.70
Wire nails, Pittsburgh	1.75	1.75	1.75	1.70
Cut nails, f.o.b. Eastern mills	1.60	1.60	1.60	1.60
Cut nails, Pittsburgh	1.45	1.45	1.45	1.50
Fence wire, ann'd. 0 to 9, Pgh.	2.05	2.05	2.05	2.00
Barb wire, galv., Pittsburgh	2.05	2.05	2.05	2.00

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

	Sept. 10, 1913.	Sept. 3, 1913.	Aug. 13, 1913.	Sept. 11, 1913.
Coke, Connellsville, Per Net Ton at Oven.....	\$2.25	\$2.50	\$2.50	\$2.25
Furnace coke, prompt shipment.....	2.25	2.50	2.50	2.25
Furnace coke, future delivery.....	2.90	2.90	2.90	2.40
Foundry coke, prompt shipment.....	3.00	3.00	3.00	2.50
Foundry coke, future delivery.....				

Metals.	Cents.	Cents.	Cents.	Cents.
Per Pound to Large Buyers!	16.87½	16.25	16.00	17.75
Lake copper, New York.....	16.02½	16.12½	15.75	17.62½
Electrolytic copper, New York.....	5.75	5.75	5.50	7.30
Seller, St. Louis.....	5.90	5.90	5.65	7.45
Seller, New York.....	4.65	4.67½	4.40	4.95
Lead, St. Louis.....	4.75	4.75	4.50	5.10
Lead, New York.....	42.50	43.55	41.75	48.62½
Tin, New York.....	7.75	7.75	7.75	7.87½
Antimony, Hallett, New York.....	\$3.50	\$3.50	\$3.60	\$3.60
Tin plate, 100-lb. box, Pittsburgh.....				

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 21c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.40c. to 1.45c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to make base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.....	.10
Gauges under 3-16 in. to and including No. 8.....	.15
Gauges under No. 8 to and including No. 9.....	.25
Gauges under No. 9 to and including No. 10.....	.30
Gauges under No. 10 to and including No. 12.....	.40
Sketches (including straight taper plates) 3 ft. and over.....	.10
Complete circles, 3 ft. in diameter and over.....	.20
Boiler and flange steel.....	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Soil bottom steel.....	.30
Marine steel.....	.40
Locomotive firebox steel.....	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.....	1.00
Cutting to lengths, under 3 ft., to 2 ft. inclusive.....	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55
No charge for cutting rectangular plates to lengths 3 ft. and over.	

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.40c. to 1.45c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.....	.10
H-beams over 18 in.....	.10
Angles over 6 in. on one or both legs.....	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909.....	.70
Tees, structural sizes (except elevator, hand rail, car track and conductor rail).....	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.....	.20 to .80
Deck beams and bulb angles.....	.30
Hand rail tees.....	.75
Cutting to lengths, under 3 ft., to 2 ft. inclusive.....	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55
No charge for cutting to lengths 3 ft. and over.	

Wire Rods and Wire.—Bessemer, open-hearth and chain rods, \$27.50 to \$28. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, \$1.45; galvanized, \$1.85. Galvanized barb wire, to jobbers, \$2.05; painted, \$1.65. Wire nails, to jobbers, \$1.65.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

	Plain Wire, per 100 lb.							
Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed.....	\$1.65	\$1.70	\$1.75	\$1.80	\$1.90	\$2.00	\$2.10	\$2.20
Galvanized.....	2.10	2.10	2.15	2.20	2.30	2.40	2.80	2.90

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe (full weight), in effect from August 8, 1913, and iron pipe (full weight), from June 2, 1913:

Steel.			Iron.		
Inches.	Black.	Galv.	Inches.	Black.	Galv.
1½, 2 and 3.....	73	52½	1½ and 2.....	66	47
3½.....	77	66½	2.....	65	46
3½ to 3.....	80	71½	2½.....	69	56
			3½ to 2½.....	72	61
Lap Weld.			Lap Weld.		
2.....	76	67½	1½.....	56	45
2½ to 6.....	78	69½	1½.....	67	56
7 to 12.....	75	64½	2.....	68	58
13 to 15.....	52	..	2½ to 4.....	70	61
			4½ to 6.....	70	61
			7 to 12.....	68	55

Reamed and Drifted.			Reamed and Drifted.		
Inches.	Black.	Galv.	Inches.	Black.	Galv.
1 to 3, butt.....	78	69½	1 to 1½, butt.....	70	59
2, lap.....	74	65½	2, butt.....	70	59
2½ to 6, lap.....	76	67½	1½, lap.....	54	43
			1½, lap.....	65	54
			2, lap.....	66	56
			2½ to 4, lap.....	68	59

Butt Weld, extra strong, plain ends.			Butt Weld, extra strong, plain ends.		
Inches.	Black.	Galv.	Inches.	Black.	Galv.
1½, 2 and 3.....	68	57½	1½.....	63	52
3½.....	73	66½	2.....	67	60
3½ to 1½.....	77	70½	3½ to 1½.....	71	62
2 to 3.....	75	71½	2 and 2½.....	72	63

Lap Weld, extra strong, plain ends.			Lap Weld, extra strong, plain ends.		
Inches.	Black.	Galv.	Inches.	Black.	Galv.
2.....	73	64½	1½.....	65	59
2½ to 4.....	75	66½	2.....	66	58
4½ to 6.....	74	65½	2½ to 4.....	70	61
7 to 8.....	67	56½	4½ to 6.....	69	60
9 to 12.....	62	51½	7 and 8.....	63	53
			9 to 12.....	58	47

Butt Weld, double extra strong, plain ends.			Butt Weld, double extra strong, plain ends.		
Inches.	Black.	Galv.	Inches.	Black.	Galv.
1½.....	63	56½	1½.....	57	49
3½ to 1½.....	66	59½	3½ to 1½.....	60	52
2 to 2½.....	68	61½	2 and 2½.....	62	54

Lap Weld, double extra strong, plain ends.			Lap Weld, double extra strong, plain ends.		
Inches.	Black.	Galv.	Inches.	Black.	Galv.
2.....	63	56½	2.....	55	49
2½ to 4.....	65	58½	2½ to 4.....	60	54
4½ to 6.....	64	57½	4½ to 6.....	59	53
7 to 8.....	57	46½	7 to 8.....	52	42

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads on lap-welded steel, in effect from May 29, 1913, and standard charcoal-iron boiler tubes, in effect from January 1, 1913, are as follows:

Lap-Welded Steel.	Standard Charcoal Iron.
1½ and 2 in.....	1½ in.....
2½ in.....	1½ and 2 in.....
2½ and 2¾ in.....	2½ in.....
3 and 3¼ in.....	2½ to 2¾ in.....
3½ to 4½ in.....	3 and 3¼ in.....
5 and 6 in.....	3½ to 4½ in.....
7 to 13 in.....	Locomotive and steamship special grades bring higher prices.

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.
Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets.	Cents per lb.
Nos. 3 to 8.....	1.60
Nos. 9 and 10.....	1.65
Nos. 11 and 12.....	1.70
Nos. 13 and 14.....	1.75
Nos. 15 and 16.....	1.85

Box Annealed Sheets, Cold Rolled.	Cents per lb.
Nos. 10 and 11.....	1.80 to 1.90
No. 12.....	1.80 to 1.90
Nos. 13 and 14.....	1.85 to 1.95
Nos. 15 and 16.....	1.90 to 2.00
Nos. 17 to 21.....	1.95 to 2.05
Nos. 22 and 24.....	2.00 to 2.10
Nos. 25 and 26.....	2.05 to 2.15
No. 27.....	2.10 to 2.20
No. 28.....	2.15 to 2.25
No. 29.....	2.20 to 2.30
No. 30.....	2.30 to 2.40

Galvanized Sheets of Black Sheet Gauge.	Cents per lb.
Nos. 10 and 11.....	2.20 to 2.30
No. 12.....	2.30 to 2.40
Nos. 13 and 14.....	2.30 to 2.40
Nos. 15 and 16.....	2.45 to 2.55
Nos. 17 to 21.....	2.60 to 2.70
Nos. 22 and 24.....	2.75 to 2.85
Nos. 25 and 26.....	2.90 to 3.00
No. 27.....	3.05 to 3.15
No. 28.....	3.20 to 3.30
No. 29.....	3.35 to 3.45
No. 30.....	3.50 to 3.60

Pittsburgh

PITTSBURGH, PA., September 10, 1913.

The expected buying movement in the steel trade has not developed, while the situation in pig iron and semi-finished steel is quieter than in August. Consumers persist in the policy of buying only such quantities as are needed for current wants. The supply of steel in the form of billets and sheet bars being offered by the smaller mills is steadily increasing and prices are weak. The key to the situation as regards a buying movement seems to rest largely with the railroads, which have not been doing any purchasing of moment in cars or track materials for a long time. Scrap is neglected. The expected break in the price of furnace coke has come, standard grades now being offered and sold at \$2.25 per net ton at oven.

Pig Iron.—The market is very quiet, the only active inquiry out being from the Allegheny Steel Company, Brackenridge, Pa., for 3000 tons of basic iron for October delivery. The expected purchase of Bessemer iron by the Steel Corporation has not been made, and the impression is that it will not buy any in the near future as it has furnaces idle that can be started in a short time if necessary. There is some inquiry for foundry iron in small lots, consumers still buying for only about 30 days ahead. Prices are fairly strong but unchanged. We quote: Bessemer, \$15.75 to \$16; basic, \$14; malleable Bessemer, \$13.75 to \$14; No. 2 foundry, \$14; gray forge, \$13.35 to \$13.50, all at Valley furnace, the freight rate for delivery to the Cleveland and Pittsburgh districts being 90c. a ton.

Billets and Sheet Bars.—Little new inquiry is out for either billets or sheet bars, consumers being covered by contracts. The supply of steel in the form of billets and sheet bars, as offered by the smaller mills, is steadily increasing, due to the fact that the finishing mills belonging to these plants have not enough orders to run full. A sale is reported of 1500 tons of sheet bars, Bessemer or open-hearth stock, for delivery over the remainder of the year at a price that nets the seller \$25.30 at works. We quote open-hearth billets for prompt delivery, and also for shipment over remainder of the year at \$24 to \$24.50; open-hearth sheet bars for the same deliveries at \$25 to \$25.50, delivered to buyers' mills in the Pittsburgh district. For billets and sheet bars made from Bessemer steel, the larger mills are asking about \$1 a ton advance over these prices. We quote forging billets at \$30 to \$31, and axle billets at \$26 to \$27, maker's mill.

Steel Rails.—No active inquiries for 1914 rails have yet come out from the railroads, but these are expected in the near future from three or four of the leading roads. Numerous small orders for standard sections for delivery this year are being placed, aggregating considerable tonnage. The new demand for light rails is active, the Carnegie Steel Company having received new orders and specifications in the past week for about 3500 tons. We quote splice bars at 1.50c. per lb. and standard section rails at 1.25c. per lb. Light rails are quoted as follows: 25, 30, 35, 40 and 45 lb. sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c., and 8 and 10 lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Plates.—New inquiries and orders for steel cars are very light. The car companies are working pretty fast toward the end of their orders and are naming lower figures on cars, hoping to induce the railroads to place contracts. The New York Central has placed 55 all-steel 70-ft. passenger coaches and 31 60-ft. all-steel mail cars with the Pressed Steel Car Company and the same interest has taken 500 steel general service gondola cars for the Boston & Maine, which has also placed 500 box cars with another company. It is said that the Boston & Maine is in the market for 5000 tons of sills for center construction cars. Bids are to be opened in Washington, D. C., to-day for the Lincoln Memorial which calls for 3000 tons of sheet steel piling for the foundation. The new demand for plates is dull, and some of the smaller mills are going after orders aggressively. Specifications against contracts are fairly active, but the mills are steadily catching up on back orders, while the smaller makers will take orders for sheared plates at 1.40c. for prompt delivery. We quote ¼-in. and heavier plates at 1.40c. to 1.45c., Pittsburgh, but on a very desirable specification the lower price might be shaded.

Structural Material.—New inquiry in the past week has been quiet, and no large contracts have been taken by local interests. The bridge over the Ohio River at Portsmouth, Ohio, about 2000 tons, is reported to have been placed with a Cleveland interest. We quote

beams and channels up to 15 in. at 1.40c. to 1.45c., Pittsburgh.

Wire Rods.—Following the tendency of other lines of semi-finished and finished material, prices on rods are lower. There is not much new inquiry. We quote Bessemer, open-hearth and chain rods at \$27.50, but on desirable business this could be shaded.

Ferroalloys.—A fair amount of new inquiry is out for ferromanganese for remainder of the year delivery, and we note a sale of 100 tons and another of 200 tons at \$55, Baltimore, and also sales of carload lots for prompt delivery at the same price. Ferrosilicon is firm, and we note sales of several carloads of 50 per cent. at \$75, delivered in Pittsburgh district. We quote 80 per cent. foreign ferromanganese at \$55, Baltimore, the freight rate to the Pittsburgh district being \$2.16 a ton. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at \$75; over 100 tons to 60 tons, \$74; over 600 tons, \$73, Pittsburgh. We quote 10 per cent. ferrosilicon at \$22; 11 per cent., \$23, and 12 per cent., \$24, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnaces.

Skelp.—New inquiry is fairly active. A sale of about 1200 to 1500 tons of grooved steel skelp in narrow sizes is reported at 1.35c. delivered to buyer's mill in the Pittsburgh district. We quote grooved sheared skelp at 1.35c. to 1.40c.; sheared steel skelp, 1.40c. to 1.45c.; grooved iron skelp, 1.60c. to 1.65c., and sheared iron skelp, 1.65c. to 1.70c., delivered to buyers' mills in Pittsburgh district.

Iron and Steel Bars.—Mills rolling steel bars report a fair amount of new business, mostly for small lots to cover current needs, while specifications are not so heavy as two or three months ago. The consumption of steel bars is fully as large as at any time this year, and on hard steel bars for reinforcing purposes is heavier, but consumers are inclined to take in only such quantities as are needed for current wants. The implement makers are now well covered, and are commencing to specify, but not freely. The steel-bar mills are pretty well filled for several months, and if consumers specify will no doubt run full to the end of the year at least. The new demand for iron bars is quiet, and the mills are well caught up on back orders. We quote steel bars for forward delivery at 1.40c. and for shipment from warehouse in small lots at 1.90c. We quote iron bars at 1.55c. to 1.65c. The mills continue to charge \$1 extra per ton for twisting ¾-in. and larger steel bars and \$2 extra for ½ to ⅝ in. In some cases, however, these extras are being shaded.

Sheets.—There is not much new demand for either black or galvanized sheets, consumers still placing orders only for actual needs. There has been a slowing down in operations among some of the sheet mills, due to lack of business. While No. 28 black seems to have settled down to 2.15c., the leading interest is obtaining as high as 2.25c. on some current business, and up to 3.30c. on No. 28 galvanized. Whatever lower prices the sheet mills have recently obtained on sheet bars seem to have been given up to buyers of sheets, as prices have declined fully as much on sheets as on bars. The new demand for electrical and special grade sheets is referred to as fairly heavy. The American Sheet & Tin Plate Company is operating this week to 72 per cent. of hot sheet mill capacity, while some of the other mills are running at a less rate, and some at a greater rate. We quote Nos. 9 and 10 blue annealed sheets at 1.65c.; No. 28 Bessemer black, 2.15c. to 2.25c.; No. 28 galvanized, 3.20c. to 3.30c.; No. 28 tin mill black plate, 2.15c. to 2.20c., and No. 30, 2.20c. to 2.25c. These prices are f.o.b. Pittsburgh, in carload and larger lots, jobbers charging the usual advances for small lots from store.

Tin Plate.—There is practically no new demand. Neither large consumers nor jobbers have commenced to think about contracts, which probably will not be placed for some time yet. Specifications against contracts are still coming in quite freely, and on some sizes of standard tin plate there is a scarcity. The Clarksburg works of the Phillips Sheet & Tin Plate Company is again in full operation, and its Pope works is also running nearly full. There is no trouble now in getting a full supply of steel; in fact some of the tin plate mills are receiving it faster than they can use it. The American Sheet & Tin Plate Company continues to operate to 84 per cent. of its hot tin mill capacity. We quote 100-lb. cokes at \$3.50 to \$3.60 and 100-lb. ternes at \$3.35 to \$3.45, the higher prices being for small lots.

Spikes.—There is no indication of any new railroad buying in the near future, and as most contracts have been cleaned up operations among the spike mills are quiet. The new demand is only for small lots to cover

actual needs. We quote railroad spikes in base sizes, $1\frac{1}{2}$ x 9/16 in., at \$1.65 to \$1.70, and small railroad and boat spikes in carload and larger lots at \$1.75 to \$1.80 per 100 lb., f.o.b. Pittsburgh.

Bolts and Rivets.—The new demand for nuts and bolts is said to be slightly better, and discounts are firmer than for some time, but consumers are still buying only in small lots to cover current needs. The new demand for rivets is quiet, and consumers are not disposed to contract ahead. We quote button-head structural rivets at \$1.90 in large lots and \$2 in small lots, and cone-head boiler rivets at \$2 in large lots and \$2.10 in small lots, terms 30 days net, less 2 per cent. for cash in 10 days. Regular discounts on nuts and bolts are as follows in lots of 300 lb. or over, delivered within a 20c. freight radius of maker's works:

Coach and lag screws	.....80 and 10% off
Small carriage bolts, cut threads	.....75 and 5% off
Small carriage bolts, rolled threads	.....75 and 10% off
Large carriage bolts	.....70 and 2½% off
Small machine bolts, cut threads	.....75 and 10% off
Small machine bolts, rolled threads	.....75, 10 and 5% off
Large machine bolts	.....70 and 7½% off
Machine bolts with C.P.C. and T nuts, small	75 and 5% off
Machine bolts with C.P.C. and T nuts, large	.....70% off
Square hot pressed nuts, blanked and tapped	.....\$5.70 off list
Hexagon nuts	.....\$6.30 off list
C.P.C. and R. square nuts, tapped and blank	.....\$5.70 off list
Hexagon nuts, ¾ and larger	.....\$6.60 off list
Hexagon nuts smaller than 9/16	.....\$7.20 off list
C.P. plain square nuts	.....\$5.20 off list
C.P. plain hexagon nuts	.....\$5.50 off list
Semi-finished hexagon nuts, ¾ and larger	......85% off
Semi-finished hex. nuts smaller than 9/16	......85 and 10% off
Rivets, 7/16 x 6½, smaller and shorter	75, 10 and 10% off
Rivets, metallic timed, bulk	.....3½c. per lb. net extra
Rivets, tin plated, bulk	.....1½c. per lb. net extra
Rivets, metallic timed, packages	.....70, 10 and 10% off
Standard cap screws	.....75, 10, 10 and 7½% off
Standard set screws	.....75, 10, 10 and 7½% off

Shafting.—As noted last week the shafting market is reported firmer, but new demand continues quiet, being mostly in small lots to cover current needs. Specifications against contracts are only fair. The regular discount on cold-rolled shafting remains at 60 off in carloads and 55 in small lots, but on desirable orders one point better is being done.

Hoops and Bands.—The demand is only for small lots, and consumers are specifying against contracts for only such quantities as are actually needed. We quote steel hoops at 1.50c. and bands at 1.40c., with extras on the latter as per the steel bar card.

Wire Products.—The heavy buying in wire nails which prevailed during the greater part of August is pretty well over, as jobbers and consumers have covered their requirements for some time ahead. The mills now have a heavy business on their books, and if specifications against these contracts are received they will probably run to full capacity for several months. As yet nothing official has been given out as to any change in prices, but it is believed in the trade that before this month expires there may possibly be an advance, which if made would probably stimulate specifications against contracts now on the books of the mills. In the past week a number of manufacturers have sent to the trade spring terms on fencing. We quote: Wire nails to jobbers, \$1.65; cut nails, \$1.60; plain annealed wire, \$1.45; galvanized barb wire, \$2.05, and painted barb wire, \$1.65, f.o.b. Pittsburgh, per 100 lb., usual terms, actual freight added to point of delivery.

Merchant Steel.—The new demand is only for small lots. Two leading mills state that shipments in August were slightly heavier than in July, but the amount of new business entered was less. The mills are pretty well caught up on back orders and customers are able to get prompt deliveries. Nominal prices, which are being shaded more or less, depending on the order, are as follows: Iron finished tire, $1\frac{1}{2}$ x $\frac{1}{2}$ in. and larger, 1.40c.; base; under $1\frac{1}{2}$ x $\frac{1}{2}$ in., 1.55c.; planished tire, 1.60c.; channel tire, $\frac{3}{4}$ to $\frac{1}{2}$ in., 1.90c. to 2c.; $1\frac{1}{2}$ in. and larger, 2c.; toe calk, 2c. to 2.10c.; base; flat sleigh shoe, 1.75c.; concave and convex, 1.80c.; cutter shoe, tapered or bent, 2.30c. to 2.40c.; spring steel, 2c. to 2.10c.; machinery steel, smooth finish, 1.85c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and $1\frac{1}{2}$ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.30c.; soft, 3.55c.; coils, hard, 3.20c.; soft, 3.45c.; freight allowed. The usual differentials apply for lighter gauges and sizes.

Standard Pipe.—Conditions in the pipe trade show no important change. The new demand for lap-weld and line pipe continues heavy and most of the leading mills have about all the business on their books they can handle over remainder of this year. Three or four large projects involving a heavy tonnage of pipe for gas and oil lines are under way, but rights of way and financing will have to be taken care of before these will come on the market. The shortage in supply of

iron pipe is getting more acute, the puddling plants of five of the largest makers of iron pipe in the Central West still being idle on account of their refusal to sign the Sons of Vulcan scale. Discounts on both iron and steel pipe are referred to as being well maintained.

Boiler Tubes.—There is a fair amount of new inquiry, but actual business being entered by the mills is lighter than for some time. Competition among the tube mills is keen, and lower prices are being named by some of the smaller mills. As yet these have not seriously disturbed the situation, the larger mills being pretty well filled for some time ahead.

Coke.—The expected break in prices of standard furnace coke has come, and sales have been made quite freely in the past week on the basis of \$2.25 per net ton at oven. A leading coke company is understood to be offering blast furnace coke at \$2.25 and to have made sales at this figure. Other makers of standard furnace coke have sold at this price, but the Producers Coke Company, Uniontown, Pa., is still holding its product firm at \$2.50. The output of Connellsville coke has again gone above the 400,000-ton mark, the Connellsville Courier reporting the make for the week ended August 30 at 403,030 tons, an increase over the previous week of over 34,000 tons. It is said this heavy increase in output is partly responsible for the lower price. We quote standard makes of furnace coke for September and forward delivery at \$2.25 to \$2.50, and best grades of 72-hr. foundry coke at \$2.90 to \$3, per net ton at oven.

Old Material.—The local market is practically lifeless. Consumers are well supplied for some time ahead and are not actively in the market, although offered scrap at as low prices as have ruled at any time for some months. The Baltimore & Ohio Railroad list closed September 4 and that of the Pennsylvania Railroad September 5. Part of the Baltimore & Ohio heavy steel scrap was secured by local dealers on the basis of \$12.60, Pittsburgh, and it is said most of the Pennsylvania heavy steel scrap went to the same consumer that bought it last month, but this is not verified. A local consumer bought in the past week about 700 tons of selected heavy steel scrap at \$13 per gross ton, delivered. Aside from this, dealers say there have been practically no sales in the past week. Dealers quote as follows, per gross ton, for delivery in the Pittsburgh district:

Selected heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	.....\$12.75 to \$13.00
Ordinary steel scrap	.....12.25 to 12.50
Compressed side and end sheet scrap	.....10.50
No. 1 foundry cast	.....12.75 to 13.00
No. 2 foundry cast	.....11.50 to 11.75
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	.....8.00 to 8.25
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	.....14.50 to 14.75
No. 1 railroad malleable stock	.....11.50 to 11.75
Grate bars	.....8.25 to 8.50
Low phosphorus melting stock	.....15.75 to 16.00
Iron car axles	.....24.50 to 25.00
Steel car axles	.....17.50 to 17.75
Locomotive axles, steel	.....21.00 to 21.50
Locomotive axles, iron	.....25.50 to 26.00
No. 1 busheling scrap	.....12.00 to 12.25
No. 2 busheling scrap	.....7.50 to 7.75
Old carwheels	.....13.75 to 14.00
* Machine shop turnings	.....6.75 to 7.00
* Cast-iron borings	.....8.25 to 8.50
† Sheet bar crop ends	.....14.00 to 14.25
Old iron rails	.....14.50 to 14.75
No. 1 railroad wrought scrap	.....13.75 to 14.00
Heavy steel axle turnings	.....9.00 to 9.25
Stove plate	.....8.25 to 8.50

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.

†Shipping point.

Chicago

CHICAGO, ILL., September 10, 1913.—(By Telegraph.)

While aggressively campaigning for business, producers of steel are minimizing such evidences of weakness as are already appearing. But new business, with the exception of steel for car building, of which over 50,000 tons has been booked by local mills following the release of 2500 cars by one road and additional purchases by others, including the Southern Railway, continues very light. Specifications also are coming in so slowly as to detract from the confidence with which the mills are viewing the contract business now on the books. In the first week of September business has looked better than in August, but August was anything but a satisfactory month. Rumors of plates on the basis of 1.40c., Pittsburgh, have been followed by the establishment of that price as a current quotation. At the same time some business continues to be taken at 1.45c. The preparation of budgets by the railroads now

under way indicates that the year will not pass without the usual period of buying. Steel bars appear to be holding their own in the face of a light demand. The bar-iron situation is hardly as favorable. The pig-iron market is quiet, with inquiry light. Local producers are well supplied with tonnage in the light of the capacity out of blast.

Pig Iron.—The aggressive liquidation of charcoal-iron stocks, as the result of which heavy tonnages have been sold in this market at prices as low as and even lower than coke iron, is abating. Quotations equivalent to \$13 at the furnace appear to represent the low ebb of the market. The inquiry from the steel foundry at Davenport for basic has been closed and, with some modest sales of malleable, constitutes the principal activity of the local furnaces the past week. Inquiry for both Northern and Southern iron is light. On the basis of the capacity in blast, the sellers' position is now fairly well secured and their attitude as to price correspondingly firm. Much needed repairs for one of the new Iroquois stacks are likely to bring about a still further reduction of capacity in blast in the course of a month. Local iron is being held at \$15 at the furnace, while Southern iron is well established at \$11, Birmingham. Inquiry for first quarter and first half iron is being discouraged by makers, and for that delivery an advance of 50c is being asked. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 1, 2, 3, 4....	\$14.75 to \$15.25
Northern coke foundry, No. 1.....	15.50 to 16.00
Northern coke foundry, No. 2.....	15.00 to 15.50
Northern coke foundry, No. 3.....	14.50 to 15.00
Southern coke, No. 1 foundry and No. 1 soft.....	15.85
Southern coke, No. 2 foundry and No. 2 soft.....	15.35
Southern coke, No. 3.....	14.85
Southern coke, No. 4.....	14.35
Southern gray forge.....	14.35
Southern mottled.....	14.10
Malleable Bessemer.....	15.00 to 15.50
Standard Bessemer.....	18.40
Basic.....	15.00 to 15.50
Jackson Co. and Kentucky silvery, 6 per cent.....	18.40
Jackson Co. and Kentucky silvery, 8 per cent.....	19.40
Jackson Co. and Kentucky silvery, 10 per cent.....	20.40

(By Mail)

Rails and Trap Supplies.—The appearance of reluctance with which the railroads have clothed their attitude as regards purchases does not accurately reflect the preparations that are being made in anticipation of next year's track work. No additional inquiries for rail tonnage have been given out, but it is well understood that the usual budgets are being made. There is little or no demand for spikes and track bolts and prices are soft. We quote standard railroad spikes at 1.70c. to 1.75c., base; track bolts with square nuts, 2.25c., base, all in carload lots, Chicago; tie plates, \$30 to \$32, net ton; standard section Bessemer rails, Chicago, 1.25c., base; open-hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—Among the larger fabricating shops in this market only two of considerable capacity are without a fair amount of work on their books, but quotations on fabricated steel indicate considerable keenness on competitive work. New structural awards reported during the past week totaled about 5000 tons, of which the most important item was 3060 tons of bridge steel for the Northern Pacific Railway Company to be furnished by the American Bridge Company. This interest will also supply 390 tons to the Denver & Rio Grande Railroad Company and 100 tons to the Minnesota Steel Company. The Chicago Bridge & Iron Company will fabricate 258 tons for a bridge over the Little Calumet River at Chicago, and the Lackawanna Bridge Company 153 tons for the Pullman Company. The Central Iron Works has been awarded 250 tons for an apartment building at San Francisco by the Starr & Larsen Company; the Omaha Structural Steel Company, 100 tons for the Eccles building, Ogden, Utah; the Pacific Rolling Mill Company, 500 tons for the Y. W. C. A. building at Oakland, Cal., and the Judson Mfg. Company, 125 tons for an apartment building, also at Oakland, Cal. Figures are being taken on steel for the new Crane Company plant at Chicago which will require several thousand tons. Mill bookings have been swelled by the recent releasing of orders for cars by one railroad which has withheld this business since last spring and by an additional purchase of cars by another road, bringing the total of tonnage made available to local mills, includ-

ing 16,000 tons for the Southern Railway cars, up to approximately 55,000 tons of car steel. Adherence to the mill basis of 1.45c., Pittsburgh, for structural shapes continues general and reports of concession from this price have no direct confirmation. We quote for Chicago delivery, from mill, 1.63c.

The customary run of small structural steel jobs is supporting a fair demand for shapes from store. We continue to quote for Chicago delivery, out of jobbers' stocks, 1.95c.

Plates.—A particularly active canvassing of the market for plate tonnage is noted. Specifications are discouragingly light, although the placing of a number of small orders is reported. There is no longer any doubt that a significant portion of the plate tonnage most recently ordered was placed on the basis of 1.40c., Pittsburgh. Most of the larger mills are making it a rule to adhere to 1.45c., but in some instances show an unwillingness to lose the business of a regular customer where the concession of \$1 per ton will meet the competition. Others of the larger mills are declining to make any exceptions to the full schedule. The active canvassing for orders is emphasized by the reappearance of other mills that have been out of the market on plates for several months. We quote for Chicago delivery, from mill, 1.58c. to 1.63c.

The dullness of the plate business out of store has not been helped by the increasingly easy mill situation. For Chicago delivery from jobbers' stocks we quote 1.95c.

Bars.—The now generally accepted fact that concessions have been made in securing some of the larger implement contracts for steel bars does not appear to be affecting current quotations, which continue firmly on the basis of 1.58c. in this market. Specifications are decidedly light. Small orders are beginning to come from the implement trade, but normal specifying against contracts has not yet appeared. The demand for bar iron is equally light. Bar-iron prices have offered comparatively little resistance to the pressure of competition following upon a meager offering of tonnage, and concessions are being made. We quote for mill shipment as follows: Bar iron, 1.40c. to 1.45c.; soft steel bars, 1.58c.; hard steel bars, 1.50c.; shafting in carloads, 60 per cent. off; less than carloads, 55 per cent. off.

Out of store the demand continues heavy for reinforcing bars, with a fair tonnage on other grades. For delivery from store we quote soft steel bars, 1.85c.; bar iron, 1.85c.; reinforcing bars, 1.85c. base, with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over, and usual card extras for smaller sizes; shafting 53 per cent. off.

Sheets.—The general status of the local market with respect to black sheets may be indicated by the fact that the quotation of 2.15c., Pittsburgh, for No. 28 is being frequently made, while for galvanized sheets, despite the advance in spelter, prices equivalent to 3.20c., Pittsburgh, for No. 28 are noted. Current business is scattering and without importance. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.83c. to 1.88c.; No. 28 black, 2.33c. to 2.38c.; No. 28 galvanized, 3.38c. to 3.43c.

We quote for Chicago delivery from store, No. 10 blue annealed, 2.15c.; No. 28 black, 2.75c.; No. 28 galvanized, 4c.

Rivets and Bolts.—The market on rivets and bolts is entirely local and quotations depart with considerable frequency from a common basis. A new rivet-making plant at Chicago, which has been completed for some time, has not yet been started and present capacity is operating on irregular schedule. With the implement contracting for bolts completed the market is experiencing a pronounced lull in that direction. We quote from mill as follows: Carriage bolts up to $\frac{3}{4}$ x 6 in., rolled thread, 75-10-7 $\frac{1}{2}$; cut thread, 75-12 $\frac{1}{2}$; larger sizes, 70-12 $\frac{1}{2}$; machine bolts up to $\frac{3}{4}$ x 4 in., rolled thread, 75-10-12 $\frac{1}{2}$; cut thread, 75-10-7 $\frac{1}{2}$; large size, 70-10-5; coach screws, 80-12 $\frac{1}{2}$ -5; hot pressed nuts, square head, \$6 off per cwt., hexagon, \$6.70 off per cwt. Structural rivets, $\frac{3}{4}$ to 1 $\frac{1}{4}$ in., 1.98c. to 2.03c., base, Chicago, in carload lots; boiler rivets, 0.10c. additional.

Out of store we quote for structural rivets, 2.70c., and for boiler rivets, 2.90c. Machine bolts up to $\frac{3}{4}$ x 4 in., 70-7 $\frac{1}{2}$; larger sizes, 65-5, carriage bolts up to $\frac{3}{4}$ x 6 in., 70-5; larger sizes, 65 off. Hot pressed nuts, square head, \$5.30, and hexagon, \$5.90 off per cwt.

Wire Products.—Noticeable improvement is seen in the movement of wire nails and plain wire. Jobbers appear willing to increase their stocks on the basis of quotations now obtainable. Prices to jobbers are as follows: Plain wire, No. 9 and coarser, base, \$1.63; wire nails, \$1.83; painted barb wire, \$1.83; galvanized, \$2.20; polished staples, \$1.83; galvanized, \$2.15, all Chicago.

Cast-Iron Pipe.—Quotations from independent pipe makers in Alabama reflect the scarcity of new business offering and are at marked concessions from recent prices. At Akron, Ohio, the United States Cast Iron

Pipe & Foundry Company secured an order for 800 tons of 48-in. pipe. At Winnipeg an award of 1100 tons is to be made September 19. We quote as follows per net ton, Chicago: Water pipe, 4-in., \$28; 6 to 12 in., \$26; 16-in. and up, \$25, with \$1 extra for gas pipe.

Old Material.—In the territory tributary to this market the mills melting scrap appear to have ample stocks of all grades and their buying is limited to the replacement of daily consumption. A much more liberal supply is available, and in consequence prices are decidedly weak, particularly for No. 1 wrought. The Santa Fe scrap continues to menace the strength of the market, and the issuance of a list carrying 9000 tons of old material has a pointedly depressing influence. Lists from the Elgin, Joliet & Eastern and the Chicago, Milwaukee and St. Paul each offer 1000 tons, while the St. Louis & San Francisco is asking for bids on approximately 500 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.

Old iron rails	\$14.00 to \$14.50
Old steel rails, rerolling	12.00 to 12.50
Old steel rails, less than 3 ft.	11.25 to 11.75
Relaying rails, standard section, subject to inspection	24.00
Old car wheels	12.75 to 13.25
Heavy melting steel scrap	10.25 to 10.75
Frogs, switches and guards, cut apart	10.25 to 10.75
Shoveling steel	10.00 to 10.50
Steel axle turnings	7.25 to 7.75

Per Net Ton.

Iron angles and splice bars	\$13.50 to \$14.00
Iron arch bars and transoms	13.75 to 14.25
Steel angle bars	10.00 to 10.25
Iron car axles	20.25 to 20.75
Steel car axles	16.00 to 16.50
No. 1 railroad wrought	10.25 to 10.75
No. 2 railroad wrought	9.50 to 10.00
Cot lorge	10.00 to 10.50
Steel knuckles and couplers	10.25 to 10.50
Steel springs	10.50 to 11.00
Locomotive tires, smooth	11.50 to 12.00
Machine shop turnings	4.90 to 5.15
Cast and mixed borings	4.75 to 5.25
No. 1 busheling	8.75 to 9.25
No. 2 busheling	6.75 to 7.25
No. 1 boilers, cut to sheets and rings	7.25 to 7.75
Boiler punchings	10.50 to 11.00
No. 1 cast scrap	10.75 to 11.25
Stove plate and light cast scrap	9.75 to 10.25
Railroad malleable	10.25 to 10.75
Agricultural malleable	9.25 to 9.75
Pipes and flues	8.00 to 8.25

Philadelphia

PHILADELPHIA, Pa., September 9, 1913.

Eastern Pennsylvania as well as **Virginia pig-iron** statistics show that deliveries are being taken freely; that orders made a substantial gain in August, and that stocks on furnace banks are considerably smaller than a month ago. These conditions, together with a good general demand for pig iron, fully maintain the strength of the market, and better prices are being obtained by a number of producers. More inquiry for first-quarter delivery has come out and some quotations have been made. The finished material market is somewhat easier. On competitive business plates and shapes are to be had at 1.55c. here, but on current small orders 1.60c. delivered rules. New business in rolled iron and steel products, except in occasional instances, does not exceed 60 to 75 per cent of producing capacity. The open-hearth billet market continues easy. Railroad buying is light, the expected heavy rail inquiries being held in abeyance. Old material is quiet, little business moving in any grade. Coke is in light demand.

Iron Ore.—The market continues at a standstill. Furnaces are finding difficulty in stocking heavy deliveries against contracts. In Swedish ore alone 70,618 tons was shipped to Philadelphia from Narvik during August. Arrivals of foreign ore at this port for the week ended September 6 included 14,500 tons from Cuba, 12,782 tons from Sweden, 12,350 tons from Newfoundland, 6413 tons from Spain and 2650 tons from Venezuela.

Pig Iron.—Transactions in rolling mill forge iron continue to be the feature of the market. In addition to purchases by a large Eastern producer-consumer reported last week, the same buyer has taken further round lots, totaling some 15,000 tons, for delivery this year. The bulk of these transactions was at \$14.75 delivered. Other sales were made at higher figures, one 1000-ton lot having been disposed of at \$15 delivered. Further forge iron buying is in sight, rolling

mills in this district now having inquiries for an aggregate of 8000 to 10,000 tons before the trade. Few producers, in view of the limited blast furnace capacity active, are anxious to take further tonnage at present prices. The general small lot movement in foundry grades has been slightly lighter, more conservatism in buying being shown by some consumers. Fewer sales are being made at \$15.75 delivered here for standard brands of No. 2 X foundry, and an increasing volume of business is being placed at \$16, while in quite a few instances \$16.25 has been paid. Inquiry for foundry iron continues active, and while the bulk of the demand has been for small lots several good inquiries have come out. The Southern Railway is in the market for 1500 tons for fourth quarter and the Pennsylvania Railroad has asked for prices on 2300 to 4600 tons of high silicon and 1100 to 2200 tons of low silicon coke foundry, 750 to 1400 tons of Lake Superior and 600 to 1200 tons of Southern charcoal pig for last quarter delivery. Cast-iron pipe makers in this district, while not making definite inquiries, would take on from 15,000 to 20,000 tons of low-grade iron, but find producers somewhat disinterested as they have little of such iron to offer. Sales of odd lots are made and Northern irons suitable for pipe making are held pretty firmly at \$15, delivered at Delaware River points. A nearby New Jersey soil-pipe maker has purchased several thousand tons of Southern low-grade iron for this year's shipment. Virginia foundry iron is moving freely, principally in small lots, with the large proportion of the sales at \$13, at furnace, for No. 2 X, although several producers are holding at \$13.25. A sale is reported covering several thousand tons of Virginia No. 2 X for New England delivery in the first quarter of next year at \$13 at furnace. Producers in this district are not inclined to book orders freely for early 1914 shipment; in fact there has been little such demand in this vicinity, although inquiries come from consumers in other districts. For the delivery named eastern Pennsylvania No. 2 X is nominally quoted at \$16 to \$16.25, delivered here. Basic iron is quiet. One inquiry for several thousand tons reported last week is still before the trade. Moderate sales of standard analysis low-phosphorus iron continue to be made at \$23 to \$23.50 delivered. Prices generally are firmer, with more sales slightly above than at the inside quoted prices. Quotations for standard brands, delivered in buyers' yards in this district, range about as follows for shipment during the remainder of the year:

Eastern Pennsylvania No. 2 X foundry	\$15.75 to \$16.25
Eastern Pennsylvania No. 2 plain	15.50 to 15.75
Virginia No. 2 X foundry	15.80 to 16.25
Virginia No. 2 plain	15.75 to 16.00
Gray forge	14.75 to 15.00
Basic	15.00 to 15.25
Standard low phosphorus	23.00 to 23.50

Ferroalloys.—There is an absence of demand in this district. Eighty per cent. ferromanganese is still nominally held at \$56, seaboard. Small lots continue to be sold at \$55. Very little business in ferrosilicon is in sight. Importations of ferromanganese at this port last week aggregated 667 tons.

Billets.—Transactions have been on a small scale for early delivery. Few negotiations involving any large quantities are under way. Specifications on contracts are fairly good. Eastern mills are operating at about 75 to 80 per cent. of capacity. Quotations are nominal at \$26 to \$27 delivered here for basic open-hearth rolling billets and \$31 to \$33 for ordinary forging billets.

Plates.—One large producer in this territory continues to receive orders at full mill capacity rate and reports some accumulation. The business is made up of small and moderate lots from various sections of the country, practically all being taken on the basis of 1.60c. delivered here. Competition for certain classes of business has, however, brought out quotations at 1.55c. here, and several round lots have been placed at the latter basis. A large amount of ship plate business is under negotiation. Bids are in on seven vessels, each of which will require several thousand tons of plates.

Structural Material.—Fabricated structural work in this district, involving any considerable quantity of plain material, has been quiet. The actual tonnage in the new Ford Motor Company building is between 3600 and 3700. A fair amount of small building and bridge work is under negotiation. In plain shapes business is largely of a miscellaneous character. Small current orders are being taken at 1.60c. delivered here, but when large quantities are involved this figure can be shaded, 1.55c. usually coming out.

Sheets.—A very fair business in small lots is coming to Eastern makers, usually subject to early delivery. Mills are fully occupied, and business is accumulating slightly on order books. Prices are holding comparatively well at 1.80c. delivered here for Western No. 10 blue annealed, while on prompt shipments Eastern mills—making smooth, loose-rolled sheets—obtain up to 1.90c.

Bars.—A somewhat better demand for ordinary iron bars is noted. Orders run larger, and while some few mills quote as low as 1.25c. mill, in sharp competition, the bulk of the business is placed at prices ranging from 1.37½c. to 1.42½c., delivered in buyers' yards in this district, with some makers having no difficulty in obtaining even better prices. Steel bars are moderately active at 1.55c. delivered here.

Coke.—The market is quiet. Makers still hold contract furnace coke at \$2.50 at oven, while prompt coke is easier with offerings ranging from \$2.30 to \$2.40 at oven, according to grade. In foundry coke, sales have been mostly in small lots at prices ranging from \$3 to \$3.15 at oven. For delivery in buyers' yards in this vicinity prices range about as follows per net ton:

Connellsville furnace coke	\$4.25 to \$4.65
Connellsville foundry coke	4.90 to 5.35
Mountain furnace coke	4.00 to 4.25
Mountain foundry coke	4.50 to 4.75

Old Material.—The majority of buyers show little interest in the market. One consumer has taken upward of 1000 tons of No. 1 heavy melting steel at \$11.75 delivered, but other mills still refuse to pay over \$11.50. Deliveries on practically all classes of material are being more closely scrutinized as to grade, and rejections have been quite heavy. A somewhat better demand for No. 1 railroad wrought scrap and cast borings is noted. Quotations are still somewhat irregular and to a large extent nominal; an approximate range for delivery in buyers' yards in this district, covering eastern Pennsylvania, taking freight rates varying from 35c. to \$1.35 per gross ton, is as follows:

No. 1 heavy melting steel	\$11.50 to \$12.00
Old steel rails, rerolling (nominal)	14.00 to 14.50
Low phosphorus heavy melting steel scrap	15.50 to 16.00
Old steel axles	18.00 to 18.50
Old iron axles (nominal)	25.00
Old iron rails	17.50 to 18.00
Old carwheels	12.50 to 13.00
No. 1 railroad wrought	14.75 to 15.00
Wrought-iron pipe	11.00 to 11.50
No. 1 forge fire	9.75 to 10.25
No. 2 light iron (nominal)	6.00
No. 2 cut busheling (nominal)	8.00 to 8.25
Wrought turnings	8.00 to 8.50
Cast borings	8.25 to 8.50
Machinery cast	12.75 to 13.25
Grate bars, railroad	9.50 to 10.00
Stove plate	9.50 to 10.00
Railroad malleable (nominal)	11.00 to 11.50

Cincinnati

CINCINNATI, OHIO, September 10, 1913.—(By Telegraph.)

Pig Iron.—The activity in basic pig iron has been a matter of much interest here and the confirmed sale of approximately 50,000 tons to a nearby rolling mill for first half shipment, together with a quiet inquiry from another mill, is understood to have stimulated the market in no small degree. It is understood that the purchase mentioned was almost equally divided between central Ohio and Lake furnaces. Another important item of interest is the advancing of quotations by a leading Southern foundry iron producer to \$11.50 for this year's shipment and \$12, Birmingham, for the first half, with instructions to its agents to refuse any strictly second quarter orders at the last-named figure. While it is expected that other makers will follow this lead there is yet a considerable quantity of No. 2 foundry iron to be obtained at \$11 for any shipment this year, but the lowest known first quarter prices are from 25c. to 50c. a ton higher. There has been more quiet buying of Southern foundry iron during the past six weeks than has come to the surface. While contracting has mostly been confined to small lots for this year's delivery a few melters have covered for first half requirements, among them being a Michigan consumer who took 1500 tons of No. 2 foundry. An Ohio melter also took 800 tons, with shipments to extend into next year. Inquiries are scarce, and business is principally done through the direct solicitation of salesmen. The rumored absorption of a large tonnage of iron by pipe manufacturers has been confirmed and a few orders were placed quietly in the past few days that have doubtless helped to strengthen the Southern market. Not much

Northern foundry iron is changing hands, although nothing below \$14, Iron-ton, can be done for this year's delivery, with practically all Hanging Rock producers holding out for 50c. advance for first half business. Jackson County silvery is much firmer, but \$17 at furnace, based on 8 per cent. silicon, can still be done for prompt shipment. The central Indiana inquiry for about 2500 tons of foundry iron previously reported is expected to be closed this week. Based on freight rates of \$3.25 from Birmingham and \$1.20 from Iron-ton we quote f.o.b. Cincinnati as follows:

Southern coke, No. 1 foundry and 1 soft ..	\$14.75 to \$15.25
Southern coke, No. 2 foundry and 2 soft ..	14.25 to 14.75
Southern coke, No. 3 foundry	13.75 to 14.25
Southern, No. 4 foundry	13.25 to 13.50
Southern gray forge	12.75 to 13.25
Ohio silvery, 8 per cent. silicon	18.20 to 18.70
Southern Ohio coke, No. 1	16.20 to 16.70
Southern Ohio coke, No. 2	15.20 to 15.70
Southern Ohio coke, No. 3	14.95 to 15.45
Southern Ohio malleable Bessemer	15.20 to 15.45
Basic, Northern	15.20 to 15.45
Lake Superior charcoal	16.25 to 17.25
Standard Southern carwheel	27.25 to 27.75

(By Mail)

Coke.—The disposal of a few small lots of Connells-ville furnace coke below \$2.50 per net ton at oven has started the report that the market is not quite so firm as it has been. Operators are complaining about the scarcity of labor; while the demand for coal has slackened somewhat, this change has not been sufficient to induce oven owners to recede from a stand recently taken on prices at which they cared to take business. One order for approximately 3000 tons of 48-hr. Pocahontas coke was recently booked at \$2.85 per net ton at oven, with shipments distributed through the next 12 months. However, other 48-hr. brands are obtainable around \$2.50 at oven for shipment this year. Foundry coke is quoted around \$3 to \$3.25 in all three districts, although one small sale of Connells-ville 72-hr. coke was recently made at \$3.40 per net ton at oven.

Finished Material.—There is only a fair carload demand for steel bars and structural shapes in this territory, but the local warehouses report an increase in the less-than-carload business. Local warehouse prices on steel bars range from 1.95c. to 2c. and on structural shapes at 2.05c. to 2.10c. Wire nails are in better demand. Railroad track material is only being bought to satisfy immediate needs.

Old Material.—Railroad offerings are slightly heavier, but bids made by dealers are generally below the prices expected by sellers. Business is dull, with probably the rolling mills as the largest purchasers. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton.

Bundled sheet scrap	\$7.25 to \$7.75
Old iron rails	12.25 to 12.75
Relaying rails, 50 lb. and up	19.75 to 20.25
Rerolling steel rails	11.25 to 11.75
Melting steel rails	9.50 to 10.00
Old carwheels	11.00 to 11.50

Per Net Ton.

No. 1 railroad wrought	\$9.25 to \$9.75
Cast borings	4.75 to 5.25
Steel turnings	4.75 to 5.25
No. 1 cast scrap	9.00 to 9.50
Burnt scrap	6.50 to 7.00
Old iron axles	16.75 to 17.25
Locomotive tires (smooth inside)	10.25 to 10.75
Pipes and flues	6.00 to 6.25
Malleable and steel scrap	7.50 to 8.00
Railroad tank and sheet scrap	4.75 to 5.25

Cleveland

CLEVELAND, OHIO, September 9, 1913.

Iron Ore.—Ore is moving down the lakes in fairly good volume. However, there is practically no demand for wild tonnage, the contract boats being able to handle all the cargoes. Both the shippers and the vessel men would be better satisfied if shipments were coming along somewhat faster. Some of the consumers are holding back on shipments to their stock piles and do not want their ore placed on docks as they expect to be able to take it in their yards a little later. This accounts to some extent for the easing up in shipments. The movement to September 1, 32,007,072 tons, is an increase of 2,955,920 tons over the same period a year ago. August shipments were 7,677,601 gross tons, a falling off of 526,815 tons from July, the decrease being

due to the strike on the ore docks at the head of the lakes. The feeling is becoming more general that the expected 30,000,000-ton movement will not be reached this year. We quote prices as follows: Old range Bessemer, \$4.40; Mesaba Bessemer, \$4.15; old range non-Bessemer, \$3.60; Mesaba non-Bessemer, \$3.40.

Pig Iron.—A few buyers are feeling the market on prices for foundry iron for the first-half delivery, but as yet very little has been sold for shipments beyond January 1. Some furnaces so far are declining to quote prices for delivery beyond this year and others are asking advance of 25c. a ton over current prices. While some consumers would doubtless be willing to buy now for the first half delivery it is doubtful if any would be willing to pay an advance price at the present time. Some foundry iron contracts have been made for delivery through the last quarter and first quarter at last quarter prices; but with the exceptions of these contracts running into next year, producers seem unwilling to sell iron for delivery during any part of next year except at an advance in price. The inquiry of the Massillon Iron & Steel Company, for 7500 tons for delivery during the first half, 6000 tons of Nos. 3 and 4 and 1500 tons of gray forge, which was noted last week, is still pending. Several of the Lake and Valley furnaces are practically sold up for delivery over the remainder of the year and others are so well sold up that they are not anxious to take on additional business at present. The market is firm with the \$14, Cleveland and Valley furnace as the minimum quotation for No. 2 foundry. The United Steel Company, Canton, Ohio, has an inquiry out for 2000 tons of basic iron for September shipment. Southern iron is very quiet. We note the sale of 200 tons of No. 4 in Cleveland at \$10.25, Birmingham for delivery the remainder of the year. Southern furnaces are asking \$11.25 for No. 2 for the first quarter and \$11.50 for the first half delivery. For prompt shipment and for the last quarter we quote delivered Cleveland as follows:

Bessemer	\$16.65
Basic	15.00
Northern No. 2 foundry	\$14.50 to 15.00
Southern No. 2 foundry	15.35
Gray forge	14.25
Jackson County silvery, 8 per cent. silicon ..	18.55 to 19.05

Coke.—The market is generally quiet, but prices are firm. Some complaint is being made by consumers that they are unable to get shipments as desired. Consumers in some cases are trying to accumulate a stock in order to have a sufficient supply on hand should a car shortage cause a delay in shipment. We quote Standard Connellsville foundry coke at \$3 to \$3.20 per net ton at oven and furnace coke at \$2.50.

Old Material.—No change is apparent in the scrap market. The demand is dull and prices continue weak. Quotations, however, are about stationary. Dealers are making some sales in small lots, but few consumers are buying for future delivery. One local steel mill is still holding back for shipment and others are not in the market. We quote f.o.b. Cleveland as follows:

Per Gross Ton.	
Old steel rails, rerolling	\$13.00 to \$13.50
Old iron rails	14.00
Steel car axles	17.00 to 17.50
Heavy melting steel	11.25 to 11.50
Old carwheels	12.50 to 13.00
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	10.00 to 10.50
Railroad malleable	11.00 to 11.50
Light bundled sheet scrap	8.00 to 8.50
Per Net Ton.	
Iron car axles	\$20.00 to \$21.00
Cast borings	5.75 to 6.00
Iron and steel turnings and drillings	4.50 to 4.75
Steel axle turnings	7.00 to 7.50
No. 1 busheling	10.25 to 10.50
No. 1 railroad wrought	10.50 to 11.00
No. 1 cast	11.00 to 11.50
Stove plate	8.50 to 8.75
Bundled tin scrap	10.00 to 10.50

Finished Iron and Steel.—While the market is not active, there appears to be an improvement in the demand as compared with a month ago. Current orders for small lots for early delivery are more numerous. There is considerable demand for structural material in lots of 100 tons and under. Prices on steel bars are firm at 1.40c., Pittsburgh, while plate prices are being shaded \$1 a ton by some of the smaller mills. The Penn Bridge Company has taken 2000 tons of steel for a new bridge in Hamilton County, Ohio. An inquiry is out for 3500 tons for a new automobile assembling plant to be built in Philadelphia by the Ford Motor Company, Detroit. Considerable other structural tonnage is in prospect for manufacturing plants. The contract for the superstructure for the Superior avenue viaduct, Cleveland, has been awarded to the Hunkin-

Conkey Company, Cleveland. This will require 2630 tons of bars and 400 tons of structural material. As this steel is not required for several months, its purchase may be deferred. While the demand for sheets is fair, there is apparently not enough business to keep all the mills filled up. Blue annealed sheets are being shaded to 1.60c. for No. 10. We quote No. 28 black sheets at 2.15c. to 2.20c. and No. 28 galvanized sheets at 3.15c. to 3.20c. The Cambria Steel Company has taken 500 tons of 80-lb. rails for tracks around the steel plant of Corrigan-McKinney & Co. The demand for light rails continues very active. Bar iron is in moderate demand and prices continue weak. We quote iron bars 1.40c. to 1.45c., Cleveland. Warehouse prices remain at 2c. for steel bars and 2.10c. for plates and structural material.

German Business Still Falling Off

Pig Iron Now in Declining Demand—
Plate Prices the Lowest in Four Years

BERLIN, August 28, 1913.

Prices have been more steady, but market reports are dominated by a note of deep pessimism. The position of the trade is evidently still weakening, although some sections continue fairly strong, or, as in the case of steel rails, remarkably strong. The weakness is now reaching sections of the trade hitherto untouched by it, and cases where mills are running on short time are now mentioned more frequently than previously. The heavy break in plate prices previously reported has made a very bad impression in the trade. The worst of the matter is that further scaling of prices in this specialty is looked for.

The position of pig iron is depreciating. Calls for delivery are much less urgent than some weeks ago, and shipments are growing lighter. Further, the large companies, which had up to a recent date been working up their entire pig output, are now offering iron to the syndicate, so that the available supplies are growing more abundant at the moment when the market demand is slackening. In the export trade the competition of outside producers is being more keenly felt by the German furnaces.

Plate Prices the Lowest in Four Years

Prices quoted on heavy plates this week range between 108 and 110 marks (\$25.70 to \$26.18), with 1½ per cent. discount, as compared with 110 to 112 marks (\$26.18 to \$26.66) last week. This week's prices are described as the lowest for four years. In view of the heavy increase in production and the sharp competition in the foreign trade, it is believed that heavy plates will drop still lower. There is manifestly a marked overproduction. Not less than nine companies in the western and southwestern iron districts are mentioned as having begun within a few months to operate new plate mills, or as having enlarged their old mills. These include such important establishments as Gelsenkirchen, Hoesch, Hasper, Niederrheinische Hütte and Geisweiler. In thin plates prices have apparently been maintained for a week, but the position is very unsatisfactory. In the Siegerland region prices have fallen 5 marks (\$1.19) and more within four weeks; and some of the thin plate mills there are reported as being in a state of real distress. In that district prices range from 120 marks (\$28.56) downward. In the Essen and Westphalian region prices are higher than the above, ranging as high as 125 to 128 marks (\$29.75 to \$30.46) for some special grades.

Despite the denials of the association, band-iron prices are giving way. They range between 122.50 and 125 marks (\$29.15 and \$29.75), with 1½ per cent. off. Even a slightly lower price is mentioned for inferior grades. According to a statement inspired by the association, the works have taken considerable orders within the past few weeks at the reduced prices, and some of them have stopped taking orders, whereas dealers are still trying to get even better terms.

It is believed that the Steel Works Union, at a meeting to be held in about three weeks, will reduce the price of structural shapes.

The Deutsch-Luxemburg Company reports excellent results for the past business year. Gross profits were about 32,000,000 marks (\$7,616,000), as compared with 26,191,000 marks (\$6,332,468) last year. The dividend is 10 per cent. on a capital of 120,000,000 marks (\$28,560,000), as compared with 11 per cent. on 100,000,000 marks (\$23,800,000) last year. The Geisweiler Eisenwerke, the most important company of the Siegerland district, reduced its dividend from 15 to 11 per cent. The unfavorable result was due to the fact that a considerable part

of the earnings was devoted to paying for extensions of the plant. The Gelsenkirchen Company will put 240 additional coke ovens in operation at its Bonifacius mine October 1, making this the largest coking plant in Germany.

The Belgian market sends better reports this week. Export prices for semi-finished steel at Antwerp have further risen: Slabs to 81 to 83s. (\$19.71 to \$20.20); billets to 78 to 80s. (\$18.97 to \$19.71), and ingots to 77 to 79s. (\$18.73 to \$19.71), all f.o.b. On the other hand, bands lost 2s. (49c.) to 127s. 9d. to 130s. (\$31.02 to \$31.62) at the end of last week. Bars have remained steady, but the price reductions made in plates for export to meet German competition have not yet been recovered.

British Markets Do Not Improve

Speculative Activity Continues in Pig Iron, but Semi-finished Steel and Other Products Are Dull

(By Cable)

LONDON, ENGLAND, September 10, 1913.

Speculative activity continues in pig iron, and higher prices are talked of. The general demand, however, is quiet and featureless, waiting for autumn buying to develop. Semi-finished steel and finished products are dull. Stocks of pig iron in Connal's stores are now 180,891 gross tons, against 186,919 tons a week ago. We quote as follows:

Cleveland pig-iron warrants (Tuesday), 54s. 9d. (\$13.32), against 55s. 10½d. (\$13.59) a week ago.

No. 3 Cleveland pig iron, makers' price f.o.b. Middlesbrough, 55s. 6d. (\$13.50), against 56s. 6d. (\$13.75) a week ago.

Ferromanganese, £10 11s. 9d. (\$51.53), f.o.b. shipping port.

Steel sheet bars (Welsh), delivered at works in Swansea Valley, £4 15s. (\$23.11).

German sheet bars, f.o.b. Antwerp, 87s. 6d. (\$21.29).

German 2-in. billets, f.o.b. Antwerp, 80s. (\$19.46).

German basic steel bars, f.o.b. Antwerp, £4 16s. to £4 17s. (\$23.36 to \$23.60).

Steel bars, export, f.o.b. Clyde, £6 10s. (\$31.63), a decline of 2s. 6d. (61c.).

Steel joists, 15-in., export f.o.b. Hull or Grimsby, £6 5s. (\$30.42).

German joists, f.o.b. Antwerp, £5 8s. to £5 11s. (\$26.28 to \$27.01).

Steel ship plates, Scotch, delivered local yards, £7 15s. (\$37.72).

Steel black sheets, No. 28, export f.o.b. Liverpool, £9 5s. (\$45.02).

Steel rails, export f.o.b. works port, £6 10s. (\$31.63).

Tin plates, cokes, 14 x 20, 112 sheets, 108 lb. f.o.b. Wales, 13s. 1½d. (\$3.19).

Boston

BOSTON, MASS., September 9, 1913.

Old Material.—The only improvement to be noted in the market is the increase in hopefulness. Dealers do not expect exceptionally good business this fall, but they look for at least a normal demand. The mills are buying to some extent, but usually at their own prices. They appear to control the market. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of \$2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices:

Heavy melting steel	9.00 to 9.25
Low phosphorus steel	13.75 to 14.75
Old steel axles	13.75 to 14.75
Old iron axles	21.25 to 21.75
Mixed shafting	13.25 to 13.50
No. 1 wrought and soft steel	10.75 to 11.00
Skeleton (bundled)	7.75 to 8.25
Wrought-iron pipe	8.75 to 9.25
Cotton ties (bundled)	8.75 to 9.25
No. 2 light	3.75 to 4.25
Wrought turnings	5.50 to 5.75
Cast borings	5.50 to 5.75
Machinery, cast	11.75 to 12.25
Malleable	10.25 to 10.75
Stove plate	8.00 to 8.50
Grate bars	7.00 to 7.25
Cast-iron carwheels	13.75 to 14.25

St. Louis

St. Louis, Mo., September 8, 1913.

The steadiness with which business is being maintained at a good level in this territory is interesting in the light of the crop reports which developed just about as the trade had practically discounted the prospective effect of tariff legislation and currency discussion.

Pig Iron.—Transactions of the week are notable for including a considerable number of contracts for deliveries through the first and second quarters of next year, heretofore refused by furnaces. On No. 2 Southern, Birmingham basis, the quotation here is now \$11 for immediate and last quarter delivery, \$11.25 for first quarter and \$11.50 for second quarter, with expectation growing, as a result of the existing firmness, that prompt and last half figures will be moved up a peg shortly. No. 2 Ohio foundry iron is quoted at \$14 to \$14.50, Ironton basis, and Chicago No. 2 X at \$14.50 to \$15, furnace. Transactions have been quite numerous and it is known that several of good size have been withheld from publication. Included in the sales of Northern iron are: 2000 tons of basic for last quarter, 500 tons of coke carwheel iron for September delivery; 600 tons of Northern basic for last and first quarter delivery; 800 tons of foundry iron for last quarter, together with a very widespread number of small orders running from carload lots up to 150 tons for delivery at once and through the last quarter. Sales of Southern iron have included two of 500 tons; one of 1000 tons; one of 300 tons; two of 250 tons, and several of 125 tons and below, a considerable proportion of this being for delivery over the first half of 1914. At the close of the week practically no inquiries were left unfilled, indicating a fixed need for the material. Transactions closed today included 900 tons of No. 2 Southern, and 800 tons and 400 tons at the market, the tone being stronger than at the close of the week.

Coke.—While prices are still reasonably firm, there seems to be an expectation of concessions in present prices. One sale of about 2000 tons was booked for extended delivery. The quotations for by-product coke continue to be on a parity with the figures for Connellsville.

Old Material.—There is an irregular condition prevailing as to both prices and the movement of the material. The rolling mills are busy, but are not taking material except for particular needs, while for foundry grades there are inquiries, though not in large amount. The steel plants are making some inquiry for special scrap, but only in fair quantity. Lists out include 200 tons from the Kansas City Southern, 700 tons from the Mobile & Ohio, 600 tons from the Frisco, 500 tons from the Chicago & Alton and 200 tons from a local industry, all closing this week. Relaying rails continue scarce and firm at quoted prices. We quote dealers' prices, f.o.b. St. Louis as follows:

	Per Gross Ton.	
Old iron rails	12.00 to 12.50	
Old steel rails, re-rolling	11.00 to 11.50	
Old steel rails, less than 3 feet	10.00 to 10.50	
Relaying rails, standard section, subject to inspection	23.50 to 24.50	
Old carwheels	11.25 to 11.75	
Heavy melting steel scrap	9.50 to 10.00	
Shoveling steel	9.00 to 9.50	
Frogs, switches and guards cut apart	9.50 to 10.00	
	Per Net Ton.	
Iron fish plates	11.00 to 11.50	
Iron car axles	19.00 to 19.50	
Steel car axles	14.50 to 15.00	
Wrought arch bars and transoms	13.50 to 14.00	
No. 1 railroad wrought	10.00 to 10.50	
No. 2 railroad wrought	9.50 to 10.00	
Railroad springs	9.00 to 9.50	
Steel couplers and knuckles	9.50 to 10.00	
Locomotive tires, smooth	10.50 to 11.00	
No. 1 dealers' forge	10.00 to 10.50	
Mixed borings	4.00 to 4.50	
No. 1 busheling	8.50 to 9.00	
No. 1 boilers, cut to sheets and rings	6.00 to 6.50	
No. 1 cast scrap	10.00 to 10.50	
Stove plate and light cast scrap	7.50 to 8.00	
Railroad malleable	8.50 to 9.00	
Agricultural malleable	7.00 to 7.50	
Pipes and flues	6.75 to 7.25	
Railroad sheet and tank scrap	6.00 to 6.50	
Railroad grate bars	7.00 to 7.50	
Machine shop turnings	5.00 to 5.50	
Bundled sheet scrap	5.00 to 5.50	

Finished Iron and Steel.—While the run of new structural business continues to show only about 50 to 60 per cent. of shipments, there is much interest developing in the manner in which material is going into consumption and the insistence on the pushing forward of material which has been specified. Fabricating shops are busy and see an excellent quantity of business ahead. Reinforcing bars are in good request, while ordinary bars are in fair demand. Plates have been in somewhat better demand. In light rails the coal

lines are buying to some extent, but the lumber interests are very quiet. Track fastenings are in ordinary demand.

Birmingham

BIRMINGHAM, ALA., September 8, 1913.

Pig Iron.—The status of order books, the active furnace capacity, the insistent demand for prompt and heavy shipments and the rapid depletion of yard stocks point to higher prices for foundry iron. The minimum of \$11 has been withdrawn by three interests representing a total of eight of the twelve active foundry stocks, and two of them are holding for \$11.50 without special desire to sell more at this time. The Sloss-Sheffield Steel & Iron Company reports additional sales of over 20,000 tons in the first week of September, which, taken with the sales made in July subsequent to the holidays and those of August, make a total of nearly 100,000 tons booked by that company alone in many days. This is the equivalent of four months' make, with the company's present active capacity of three furnaces. Another interest reports 5000 tons sold in the first week of September. All this September business was on the \$11 basis. Out of the 21 active coke furnace stacks in Alabama, 9 are on basic iron, which is consumed largely at home, hence the available quantity for the general foundry market under these conditions is not nearly so great as it was a few years ago—a condition which must be borne in mind by the foundry-iron consumer. The present active capacity is about as follows: Tennessee Company, 6 at Ensley, 1 at Alice and 1 at Oxmoor, all on basic, with 2 at Bessemer on foundry; Sloss-Sheffield, 3 on foundry; Republic, 2 on foundry; Woodward Iron Company, 3 on foundry; Standard Steel, 1 on basic; Alabama, 1 on Clifton foundry, a special brand bringing \$1 to \$1.50 premium; Central Coal & Iron, 1 on foundry, which is partly consumed in the company's pipe shops and the rest largely a special iron commanding premium. Two charcoal furnaces are making a car-wheel iron that is selling for \$25 in small lots and \$20 for large lots. Brokers failed to get any foundry iron during the week under \$11.25 for carloads and other small lots. An offer of 3000 tons from a local concern was given a quotation of \$11.50. A number of inquiries for 1913 iron have failed to elicit quotations, the operators preferring to take their chances on higher prices. As a rule, they are looking for a repetition of last autumn's market, which commenced rising in the early fall until \$14 and over was reached. Nos. 3 and 4 foundry are selling at the 25c. differential. We quote, per gross ton, f.o.b. Birmingham district furnaces, the first figure being the absolute minimum and perhaps not to be obtained any longer, and the second the price demanded by the leading foundry sellers, as follows:

No. 1 foundry and soft.....	\$11.50 to \$12.00
No. 2 foundry and soft.....	11.00 to 11.50
No. 3 foundry.....	10.50 to 11.00
No. 4 foundry.....	10.25 to 10.75
Gray forge.....	10.00 to 10.50
Basic.....	11.00 to 11.50
Charcoal.....	24.50 to 25.00

Old Material.—Dealers report conditions steadily improving since the recent spurt in the pig-iron business. Some heavy transactions have been made locally in heavy machinery as well as in light steel and cast scrap. Dealers are inclined to take on heavy stocks, with the assurance of their disposal. Quoted prices some nearer representing actual transactions than in some time. We quote, per gross ton, f.o.b. dealers' yards as follows:

Old iron axles (light).....	\$15.00 to \$15.50
Old steel axles (light).....	15.00 to 15.50
Old iron rails.....	13.50 to 14.00
No. 1 railroad wrought.....	12.00 to 12.50
No. 2 railroad wrought.....	10.00 to 10.50
No. 1 country wrought.....	9.50 to 10.00
No. 2 country wrought.....	8.50 to 9.00
No. 1 machinery cast.....	9.50 to 10.00
No. 1 steel scrap.....	10.50 to 11.00
Tram carwheels.....	10.50 to 11.00
Standard carwheels.....	12.00 to 12.50
Light cast and stove plate.....	8.25 to 8.75

Cast-Iron Pipe.—Pipe makers are not satisfied with conditions. Pig iron has gone up and higher prices have been paid for the autumn supply of raw material, but the pipe foundries find it difficult to secure prices for their output in consonance with the rise in pig metal. Nominal quotations are continued at \$22 for 4-in. and \$20 for 6-in. upward, with \$1 added for gas pipe. Some shops are running to capacity, but in others some pits are out. No large orders are in sight.

Coal and Coke.—Coal is in greater demand and is being sold in larger quantities. There is no doubt that the mines will be called upon for a maximum output from now on at good prices. Railroad officials are beginning to predict the probability of a car famine. That alone will curtail the coal output. Coke is in strong demand at the prices maintained for some time. We quote per net ton, f.o.b. oven, as follows: Furnace coke, \$3.25 to \$3.50; foundry, \$3.75 to \$4.25.

Buffalo

BUFFALO, September 10, 1913.

Pig Iron.—Although inquiry and placement for the week was of only moderate volume there is a marked undertone of strength and prices have risen to a somewhat higher level, averaging 25c. to 50c. per ton for all grades except for charcoal iron. About 12,000 tons made up almost entirely of small tonnage orders were bought, coming from New York State and Canada, for prompt and fourth quarter shipment. Buyers are not yet coming into the market to any appreciable extent for 1914 delivery. Melters are urging quick shipment on existing contracts and even anticipating specified deliveries, an encouraging feature for producers. Increased interest has been shown in charcoal iron on account of the lessening differential between that grade and coke irons, as the price of charcoal iron has not advanced proportionately. For delivery covering remainder of the year we quote as follows, f.o.b. furnace, prices for city delivery being 25c. per ton higher:

No. 1 foundry.....	\$14.75 to \$15.00
No. 2 X foundry.....	14.25 to 14.75
No. 2 plain.....	14.00 to 14.25
No. 3 foundry.....	14.00
Gray forge.....	13.75 to 14.00
Malleable.....	14.50 to 14.75
Basic.....	14.50 to 14.75
Charcoal, regular brands.....	15.75 to 16.75
Charcoal, special brands and analysis.....	17.00 to 20.00

Old Material.—The only activity shown is in cast-iron borings and heavy axle turnings. Lack of orders from the principal interest using heavy melting steel has caused that commodity to soften from \$11 to \$11.50 per ton to \$10.50 to \$11. Old carwheels have also shown a decline of 50c. per ton. Other prices in the old material schedule remain nominally the same as quoted last week. We quote as follows per gross ton, f.o.b. Buffalo:

Heavy melting steel.....	\$10.50 to \$11.00
Boiler plate, sheared.....	12.50 to 13.25
Bundled sheet scrap.....	8.00 to 8.50
No. 1 busheling scrap.....	10.50 to 11.00
No. 2 busheling scrap.....	8.00 to 8.50
Low phosphorus steel scrap.....	16.50 to 17.00
Iron rails.....	15.00 to 15.50
No. 1 railroad wrought.....	13.00 to 13.50
No. 1 railroad and machinery cast scrap.....	13.00 to 13.50
Steel axles.....	17.00 to 17.50
Iron axles.....	22.50 to 23.00
Carwheels.....	12.50 to 13.00
Railroad malleable.....	12.00 to 12.50
Locomotive grate bars.....	10.00 to 10.50
Stove plate (net ton).....	9.75 to 10.00
Wrought pipe.....	9.50 to 10.00
Machine turnings.....	6.00 to 6.50
Heavy steel axle turnings.....	8.00 to 8.75
Clean cast borings.....	6.25 to 6.75
Bundled tin scrap.....	14.00

Finished Iron and Steel.—The market in finished products is moving very satisfactorily to mills and agencies in this district, with an increasing volume of new business noted in most lines. The general tone shows a notable improvement over that existing in July. While new inquiry represents small lots principally a number of contracts have been booked for bar material running from 150 to 600 tons each, for delivery over the remainder of the year and up to April 1. These contracts were placed without concessions from current prices, which are on the same base as has been maintained for the past year and are now firmly held by sellers. In wire and wire products the situation looks decidedly encouraging and most interests say that the month of August footed up one of the largest month's bookings in the history of the business, and from the business so far booked in September the indications are that it will be a very good month. There is no change in prices, nails being quoted at \$1.65 and plain wire at \$1.45. In black and galvanized sheets a fair volume of business is being placed and the market has a cheerful outlook. In structural lines business shows a continuation of activity among fabricators and erectors, many building operations of moderate size being under way and prices fairly firm. The Eastern Concrete Steel Company, this

city, has contract for a sub-exchange building for the New York Telephone Company at Parker avenue, taking about 100 tons of steel, and the Western Building Company, this city, for an addition to the Tonawanda Brewery at Tonawanda, requiring a like tonnage. Bids are in for 1500 tons for the Union Carbide Company at Welland, Ont., and are soon to be taken for the Palace Theatre, Ferry and Grant streets, 400 tons, and for a Grand Trunk passenger and freight station at the International Bridge entrance, 350 tons.

New York

NEW YORK, September 10, 1913.

Pig Iron.—The market is quieter, but a certain amount of business pending last week has been closed up, including two or three inquiries of some size, in which New York offices have a direct or indirect interest. One contract on which prices are definitely known is that for 900 tons of 3 to 3.25 per cent. silicon iron and 600 tons of 2 to 2.50 per cent. silicon iron, for a Paterson, N. J., foundry. The high silicon iron was sold at \$15.75, delivered, figuring back to \$14 at Buffalo furnace, and the remainder went at \$15.25, delivered, which, with \$1.75 freight, represents \$13.50 at western Pennsylvania furnace. An air brake company has bought between 8000 and 9000 tons of foundry iron for shipment over the last quarter of this year and the first quarter of 1914. This business went to Buffalo. Nearly half of the contract was for iron running 3.25 per cent. to 3.50 per cent. silicon. High silicon iron, in fact, has been very largely represented in recent inquiries. It is now quite evident that buyers are pretty well covered for this year, and likewise it appears that most furnaces have booked about as much iron as they can make in that time. The small lot business, which is the greater part of what is going, brings higher prices than are indicated by the Paterson, N. J., contract, above cited. Buffalo furnaces are getting \$14.25 to \$14.50 on some of the No. 2 X iron now going on the books. Eastern Pennsylvania furnaces still show quite a little variation in quotations. Two Lebanon Valley furnaces which were selling not long ago at \$14.50 at furnace for No. 2 X are now up to \$15, while some other furnaces are asking \$15.25 and \$15.50 and as high as \$15.75. In some cases inquiries are for last quarter and first quarter iron; on the latter an advance of about 25 cents on 1913 prices is asked. Now that the several large inquiries that have figured in the market recently are out of the way, quieter conditions may prevail for some time, and October may bring some good buying for 1914 delivery. We quote Northern iron for tidewater delivery as follows: No. 1 foundry \$16 to \$16.25; No. 2 X, \$15.75 to \$16; No. 2 plain, \$15.50 to \$15.75. Southern iron is quoted at \$15.75 to \$16.25 for No. 1 foundry and \$15.25 to \$15.75 for No. 2.

Ferroalloys.—There are more sales and inquiries for ferromanganese in lots of 100 tons than last week, most of the sales being made at the producer's price of \$56, Baltimore. The tendency is toward firmness, with less shading than for some time. Purchases at \$55 are apparently very few. Prices for ferrosilicon are unchanged at \$75, Pittsburgh, for carloads; \$74 for 100 tons, and \$73 for 600 tons and over. The demand is constant and normal.

Cast-Iron Pipe.—The Department of Water Supply, Gas and Electricity of the city of New York will open bids September 17 for a pipe-laying contract for Brooklyn, which will involve the purchase of about 2000 tons of 12 to 20-in. pipe. No further public lettings of importance have come out. The general demand is exceedingly quiet. The pipe foundries in this section of the country are much in need of work and some are only running on part time. Competition is becoming sharper on all business offering, and prices are sagging. Carload lots of 6-in. are quoted at about \$23 per net ton, tidewater, New York.

Finished Iron and Steel.—The conditions in the structural shape, plate and steel and iron bar markets are all so generally alike that a statement covering all of them may be made this week in a single paragraph. Business is dull and there are few signs of an immediate improvement. In the structural field, considerable interest is evidenced in the Toronto harbor improvements, involving 5000 tons of shapes and reinforcing bars, on which bids are now in, and on October 1 bids are to be taken on the Seventh avenue subway, New York. New work promising early settlement also includes 1000 tons for six bridges for the Boston & Albany, bids to be taken September 18, and 1200 tons for the Springfield,

Mass., high school. The Central Railroad of New Jersey bridge at Ashley, Pa., 200 tons, is to be built by the American Bridge Company. A contract involving close to 6000 tons for center sills for cars for the Boston & Maine has been taken by the Pressed Steel Car Company. In general car business, it is encouraging report that the New York Central has closed for about 300 passenger equipment cars, given to the American Car & Foundry Company, the Pressed Steel Car Company, the Standard Steel Car Company and the Pullman Company. The Boston & Maine has also bought 1000 cars, 500 gondolas going to the Pressed Steel Car Company and 500 box cars to the Keith Car & Mill Company. The Philadelphia & Reading is inquiring for 50 passenger equipment cars. The Chicago, Burlington & Quincy has bought 25 mail and baggage cars from the American Car & Foundry Company. Mill shipments of plain structural material and plates, which are generally obtainable promptly, are quotable at 1.40c., but Pittsburgh, with a freight rate of 0.16c. to New York, though the larger companies are still asking 1.45c. Pittsburgh, for shapes; steel bars are also at 1.50c., New York, and bar iron 1.40c. to 1.45c., New York; plate material from store takes 2.10c. to 2.15c.; steel bars, 2c. to 2.05c. and iron bars, 2.05c. to 2.10c.

Old Material.—The market is quiet. Steel work appear to be well supplied with stock, rolling mills are only buying special qualities of wrought scrap, and the foundries appear to need but meager quantities of cast scrap. A firm undertone nevertheless exists, based partly on the expectation of an early development of demand from consumers and partly on the better condition of the pig-iron market. Dealers' quotations are as follows, per gross ton, New York:

Old girder and T rails for melting	.....	\$9.00 to \$9.50
Heavy melting steel scrap	.....	9.00 to 9.50
Relaying rails	.....	21.50 to 22.00
Re-rolling rails	.....	12.50 to 13.00
Iron car axles	.....	21.00 to 21.50
Steel car axles	.....	14.50 to 15.00
No. 1 railroad wrought	.....	12.00 to 12.50
Wrought-iron track scrap	.....	11.00 to 11.50
No. 1 yard wrought, long	.....	10.50 to 11.00
No. 1 yard wrought, short	.....	10.00 to 10.50
Light iron	.....	3.50 to 4.00
Cast borings	.....	5.25 to 5.75
Wrought turnings	.....	5.00 to 5.50
Wrought pipe	.....	9.00 to 9.25
Carwheels	.....	12.00 to 12.50
No. 1 heavy cast, broken up	.....	10.75 to 11.25
Stove plate	.....	8.00 to 8.50
Locomotive grate bars	.....	7.50 to 8.00
Malleable cast	.....	9.00 to 9.50

Metal Market

NEW YORK, September 10, 1913.

The Week's Prices

Cents Per Pound for Early Delivery.						
Copper, New York.		Electro-	Tin,	Lead,	St.	Spelter-
Sept.	Lake.	lytic.	New York.	New York.	Louis.	York.
4.....	16.50	16.37½	43.80	4.75	4.65	5.90
5.....	16.50	16.37½	43.25	4.75	4.65	5.90
6.....	16.50	16.37½	43.10	4.75	4.65	5.90
8.....	16.87½	16.62½	42.87½	4.75	4.65	5.90
9.....	16.87½	16.62½	42.50	4.75	4.65	5.90
10.....	16.87½	16.62½	42.50	4.75	4.65	5.90

Copper is higher in consequence of the producer's strong August statement. Tin has declined a little under more pressure to sell than desire to buy. With the lessened demand, lead shows a weaker tendency. Spelter is easier, but quotations are unchanged. Antimony continues without interest.

New York

Copper.—The all-important feature of the copper market is the report of the Copper Producers' Association for August, issued Monday, which showed a heavy reduction in stocks and that only 38,314,037 lb., or a little over half of that required for two weeks' domestic consumption, was on hand September 1. The statistics had been more or less anticipated and therefore even prior to the report the trend of copper was upward. In the course of the advancing market there was some fairly good buying on both domestic and foreign account as far ahead as November and even to December to a small extent. September and October metal is said to be somewhat scarce. The conditions are such as might lead to a runaway market were not for restraining influences and on September 8 quotations went to 16.75c., 30 days delivered, for electrolytic, there were many predictions that 17c. or over would soon be reached. Other opinions are that the climax of the market has been reached and that prices will not go much higher unless other strengthening influences appear.

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ences develop. It is pointed out that consumers now know that stocks are low and will govern themselves accordingly. Lake is practically nominal to-day at 16.25c. to 17c. and electrolytic is quoted at 16.62½c., cash New York. Electrolytic, however, could probably be obtained under this price and perhaps as low as 15.5c. cash New York, if it can be found, but there is very little in outside hands. Heavy realizations in London yesterday had a weakening influence. London quotations to-day are £73 17s. 6d. for spot and £73 7s. 6d. for futures. Exports this month total 9243 tons.

Pig Tin.—The market was fairly active last week with nearly all of the business for nearby delivery. On Friday sales totaled 350 tons but on Monday of this week the demand slackened off and on Tuesday there was considerably more pressure to sell than desire to buy. This condition forced prices down despite favorable domestic statistics. On Monday there was a sale of 50 tons at 42.50c. The New York price to-day is 42.50c. The quotations in London are £193 15s. for spot and £192 15s. for futures. The arrivals this month total 1042 tons and there is afloat 2595 tons.

Lead.—Since the last report this metal has become still. The strike is a thing of the past, of course, except that it has left prices at a higher level. While there has been no actual change in quotations, the tendency is now toward a lower level. The situation is evident from the fact that one special lot of lead was sold at 4.62½c. f.o.b. East St. Louis, on Friday. The New York price is 4.75c. and that in St. Louis, 4.65c.

Spelter.—Quotations are unchanged at 5.90c., New York, and 5.75c., St. Louis, although the demand is less urgent and it is probable that these prices might be shaded a trifle. As with most of the metals, consumers show a disinclination to buy far ahead. The best business has been in the higher grades for brass mill requirements.

Antimony.—The demand continues light, prices are unchanged and the situation is without new features of interest. There is no halt in the importations. Quotations are 7.75c. to 8c. for Hallett's, 8.35c. to 8.40c. for Cookson's and 7.37½c. to 7.62½c. for Chinese and Hungarian grades.

Old Metals.—The demand is good and prices are rising. Dealers' selling quotations are as follows:

	Cents per lb.
Copper, heavy and crucible.....	15.75 to 16.25
Copper, heavy and wire	15.25 to 15.50
Copper, light and bottoms	13.75 to 14.25
Brass, heavy	10.25 to 10.75
Brass, light	8.75 to 9.00
Heavy machine composition	14.00 to 14.25
Clean brass turnings	9.50 to 9.75
Composition turnings	12.00 to 12.50
Lead, heavy	4.50
Lead, tea	4.25
Zinc scrap	4.50

Chicago

SEPTEMBER 9.—Copper prices have advanced rapidly, and conditions in the Lake copper district point toward a continuance of high values. The advances have also affected buying prices for scrap metal. Tin fluctuations have been marked, but without net change. We quote as follows: Casting copper, 16.75c.; Lake, 17c. to 17.25c., for prompt shipment; small lots ¼c. to ½c. higher; pig tin, carloads, 43½c.; small lots, 45½c.; lead, desilverized, 4.70c. to 4.75c.; corroding, 4.95c. to 5c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.85c.; Cookson's antimony, 10.50c., and other grades, 9.75c., in small lots; sheet zinc, \$7.75, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 14c.; copper bottoms, 12.75c.; copper clips, 13.25c.; red brass, 12.75c.; yellow brass, 9.50c.; lead pipe, 4.12½c.; zinc, 4.25c.; pewter, No. 1, 26c.; tinfoil, 32.50c.; black tin pipe, 36c.

St. Louis

SEPTEMBER 8.—Lead and spelter have been traded in quite freely, and while the settlement of the southeastern Missouri strike had the effect of slightly lowering prices quotations are well held, as follows: Lead, 4.67½c. to 4.70c.; spelter, 5.70c. to 5.75c.; tin, 43.50c. to 43.65c.; Lake copper, 17.10c. to 17.25c.; electrolytic copper, 16.85c. to 17.10c.; Cookson's antimony, 8.75c. to 8.85c. In the Joplin ore market fairly strong blende prices were the rule. The American Zinc, Lead & Smelting Company announces that it will continue operations in the district and open new ore bodies. It has a capacity of 800,000 lb. of zinc sulphide and 100,000 lb. of lead ore per week. The top price settle-

ment for choicest blends was \$52 per ton, with the range for 60 per cent. \$47 to \$49. Calamine was strong at \$21 to \$24 for 40 per cent. ore, with the top settlement at \$30. Lead ore was unchanged at \$58 for 80 per cent. Miscellaneous scrap metals are quoted as follows: Light brass, 5.50c.; heavy brass and light copper, 10c.; heavy copper and copper wire, 11.50c.; pewter, 24c.; tinfoil, 30c.; zinc, 2.75c.; lead, 3c.; tea lead, 2.75c.

Iron and Industrial Stocks

NEW YORK, September 10, 1913.

A discouraging Government cotton crop report, higher interest rates for money and continued Mexican uncertainty have united in depressing the market on most securities. A conspicuous exception, however, is found in the railroad equipment stocks, due to the expected increase in the demand for steel cars growing out of the developments in the recent disastrous wreck on the New York, New Haven & Hartford Railroad. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Am. Can, com.....	32½-34½	Pressed Steel, pref..	96-97
Am. Can, pref.....	94½-95½	Railway Spring, com.	25½-27½
Am. Car & Fdy., com.	45½-48½	Republic, com.....	23½-24½
Am. Car & Fdy., pref.	115-116	Republic, pref.....	87½-88
Am. Loco., com.....	34½-36½	Rumely Co., com....	18-21
Am. Steel Foundries	31½-31¾	Rumely Co., pref....	47-56
Bald. Loco., com.....	45½	Sloss, com.....	30-30¾
Beth. Steel, com.....	34½-36½	U. S. Steel, com....	61¾-63¾
Beth. Steel, pref.....	72½-73	U. S. Steel, pref....	108-108½
Colorado Fuel	30¾-31¾	Westinghouse Elec.	71-72½
Deere & Co., pref.....	96	Am. Ship, com.....	40
General Electric....	143½-145	Chic. Pneu. Tool. .	51½-54½
Gr. N. Ore Cert....	34-34½	Cambria Steel	45½-46½
Int. Harv., com.....	107½-109	Lake Sup. Corp.....	25½-26
Int. Harv., Corp.....	107½	Warwick	10-10½
Int. Harv., Corp., pref.	114	Crucible Steel, com.	16¾-17¾
Int. Pump, com.....	8	Crucible Steel, pref.	93-94
Lackawanna Steel ..	38-38½	Harb. Walk Ref., com.	48
Nat. En. & St., com.	14½-14¾	La Belle Iron, com.	47-47¾
Pressed Steel, com..	25-29½	La Belle Iron, pref.	124

Dividends Declared

The American Can Company, regular quarterly, 1¼ per cent., on the preferred stock, payable October 1.

The Cambria Iron Company, regular semi-annual, 2 per cent., payable October 1.

The American Car & Foundry Company, regular quarterly, 1¼ per cent., on the preferred and ½ of 1 per cent. on the common stock, payable October 1.

The Bethlehem Steel Company, regular quarterly, 1¼ per cent., on the preferred stock, payable October 1.

Pettibone, Mulliken & Co., regular quarterly, 1¼ per cent., on the first preferred stock, payable October 1.

The Brier Hill Steel Company, regular quarterly, 1¼ per cent. on the preferred stock, payable October 1.

The Youngstown Sheet & Tube Company, regular quarterly, 1¼ per cent. on the preferred stock, and 2 per cent. on the common stock, payable October 1.

The General Fire Proofing Company, regular quarterly, 1¼ per cent. on both the common and preferred stock, payable September 30.

End of Gorgona Shops, Panama Canal

It is a little startling to apprehend that the car, foundry and machine shops at Gorgona, on the Panama Canal, will shortly be submerged, together with the native village of Gorgona, which will shortly also disappear under the waters of Gatun Lake. The village dated from early times, being a trading place for those who plied the Chagres River, from the Atlantic to the mountains, and the first French Canal Company established machine and manufacturing shops near the village in the year following the formal beginning of the work in January, 1882. They were enlarged from time to time, until the plant occupied 21 acres, with a floor space aggregating about 322,370 sq. ft. It has done a large amount of repair work for railroad cars, locomotives and other mechanical equipment, and the largest single order for castings filled was for 2,924 covers for recesses in the lock walls, a total weight of 1,643,881 lb.

The new shops to which the equipment of the Gorgona shops is being moved are at Balboa, where there are 42 acres of ground and buildings with a total floor space of 523,915 sq. ft. The transfer of the iron, steel and brass foundries and the pattern shop was begun on July 28, and by now the buildings at Gorgona are probably all vacated.

Pittsburgh and Vicinity Business Notes

The Carnegie Steel Company, Pittsburgh, has placed an order with the American Locomotive Company for four 75-ton switching locomotives.

The first of the fall and winter meetings of the Pittsburgh Foundrymen's Association will be held on Monday evening, September 15. The speaker will be James M. Searle, chief smoke inspector of Pittsburgh, who will talk on "Smoke Prevention and Fuel Economies in Foundries and Metallurgical Plants in Pittsburgh."

At the annual meeting of stockholders of the Canonsburg Steel & Iron Works, Canonsburg, Pa., held last week, the officers were re-elected as follows: John F. Budke, president; John M. Watson, vice-president; George E. Retberg, secretary, and George D. McNutt, treasurer. This company has operated a sheet mill in Canonsburg for more than 30 years.

The Pittsburgh office of the National Roll & Foundry Company, works at Avonmore, Pa., has received orders as follows: Universal Rolling Mill Company, Bridgeville, Pa., a 26-in. finishing mill and two single shears for shearing heavy plates; Apollo Steel Company, Apollo, Pa., a 54-in. roller leveling machine; Pressed Prism Glass Company, Morgantown, W. Va., a power operated press for the manufacture of glass prisms.

The H. K. Porter Company, Pittsburgh, builder of light locomotives, has delivered to the Monongahela Connecting Railroad three engines for switching and transfer service, each having 23 x 28-in. cylinders and 50-in. drivers. The weight of each locomotive on driving wheels is 195,000 lb., or 309,000 lb. with tender.

Samuel Diescher & Sons, consulting engineers, Farmers' Bank Building, Pittsburgh, have prepared plans for the new plant of the Franklin Rolling Mill Company, Franklin, Pa., but the company has not yet decided whether the new plant will be built there. The works at Franklin were partially destroyed by fire in May, and as the new plant is to be larger and of greater capacity, it is possible that it may be located in the Chicago district. The old plant was equipped with two 15-ft. continuous heating furnaces and three trains of rolls, one 12 and two 18-in., for rolling rails into reinforced concrete bars, U shapes and bars for the manufacture of fabricated steel poles and towers. The company is a subsidiary of the Chicago Railway Equipment Company.

The Valley Mold & Foundry Company, Sharpsville, Pa., manufacturer of ingot molds, has made plans for additions to its plant by which its capacity will be increased 100 molds per day, or about 350 tons. When these additions have been completed the capacity will be about 1200 tons of molds and stools per day. The company obtains its entire supply of molten Bessemer iron from the Shenango Furnace Company, whose blast furnaces are located nearby. The Mold Company owns Alice blast furnace at Sharpsville, but the output of this stack is taken for the entire year by W. P. Snyder & Co., Pittsburgh.

The Driggs-Seabury Ordnance Corporation, Sharon, Pa., recently cut in its shop a steel chip 242 ft. long, $\frac{5}{8}$ in. wide, $\frac{3}{16}$ in. thick, and the spiral was 3 in. in diameter. The chip weighed 8000 lb. and was produced in turning a hollow, bored steel piston rod, for the Carnegie Steel Company. When it was found necessary to break it because of limited floor space, the workmen were obliged to use a sledge hammer.

The Bartley Automatic Nut & Bolt Fastener Company, Pittsburgh, has been chartered with a capital of \$5000 to manufacture nut and bolt fasteners from iron and steel. The incorporators are Milton Bartley, Harry D. Johnson and Andrew T. Park, all of Pittsburgh.

The strike at the Pope works of the Phillips Sheet & Tin Plate Company at Steubenville, Ohio, which has been going on since July 1, is practically over. Last week all of the 12 hot tin mills in the plant were in full operation. The trouble was caused by the determination of the company to operate the plant as an open mill, this being the practice at its Clarksburg and Weirton works.

The Sharon Steel Hoop Company, Sharon, Pa., is now occupying its new office building at Sharon. It contains rooms for the officials and clerks, also drafting and dining rooms.

The Wheeling Steel & Casting Company, North Warwood, W. Va., is making additions to its plant which will considerably increase the capacity.

The Monongahela Casting Company, Pittsburgh, has changed its name to the Pennsylvania Casting & Machine Company, Pittsburgh. J. D. Rhoads is president.

Notice has been filed at Harrisburg, Pa., that the Pittsburgh Steel Construction Company, Pittsburgh, has been legally dissolved. The plant formerly owned by this company at Economy, Pa., is now being operated by the Central Tube Company of Pittsburgh, in the manufacture of small pipe and tubes.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, reports a large gain in gross sales. It is expected that sales for the fiscal year ending March, 1922, will average very close to \$4,000,000 per month.

Five important makers of iron bars in the Pittsburgh and Youngstown districts have not signed the Sons of Vulcan scale for puddling, calling for a flat rate of \$7.50 per ton. These are the Youngstown Sheet & Tube Company, Lockhart Iron & Steel Company, Kittanning Steel & Iron Mfg. Company, A. M. Byers Company and Wheeling Steel & Iron Company. Their puddling plants are therefore shut down, causing a considerable scarcity in the supply of muck bar.

The Lockhart Iron & Steel Company, Pittsburgh, is erecting a large warehouse in which full stocks of iron bars and its other products will be carried for distribution to the local trade.

The Pittsburgh office of the Erie City Iron Works, Erie, Pa., has received an order from the Standard Sanitary Mfg. Company for two 250 hp. water-tube boilers to be fired by Green chain grate stockers.

New Warehouse of Lewis Levene & Sons

Lewis Levene & Sons, Binghamton, N. Y., dealers in old material, are erecting a new warehouse, to accommodate their increasing business. They have purchased property adjoining their present warehouse and are erecting thereon a three-story and basement building. The walls are of reinforced concrete and the interior of mill construction, heavy type. This new warehouse will give them an added floor space of over 14,000 sq. ft. The building will be connected with the present warehouse by automatic fire doors in the wall. A new three-ton electric elevator will be installed, connecting all floors of both the new and old warehouse, a new power baling press will be installed in the basement, and new power shears will be erected in the shed adjoining. The new offices will be located on the first floor, and the offices and both warehouses will be heated by steam from a new central plant. The location of their yards and warehouses on their private switch on the main line of the Delaware, Lackawanna & Western Railroad gives them excellent shipping facilities.

Valley Pig-Iron Averages for August

W. P. Snyder & Co., Pittsburgh, report the average price of Bessemer pig iron for August as \$15.657 and of basic \$14.045 at Valley furnace, to which 90c. freight should be added for delivery in the Pittsburgh district. These prices, which are based on sales of 1000 tons or over, show an average advance in Bessemer pig iron in August over July of 25c. per ton and a decline in basic of 18c. per ton. The figures thus given confirm the accuracy of quotations in the Pittsburgh market reports in *The Iron Age* in the month of August. These quotations averaged \$15.625 for Bessemer and \$14.0625 for basic. Our Bessemer average is thus \$0.032 per ton lower than that of Snyder & Co., while our basic average is \$0.0175 per ton higher. It is understood that the averages of Snyder & Co. were derived from sales of about 20,000 tons of Bessemer and 30,000 tons of basic.

The Pangborn Corporation, with general offices and works at Hagerstown, Md., has been formed to take over the business of the Thomas W. Pangborn Company, arrangements having recently been made for the re-financing of the operations so long carried on by the latter. The business consists of designing and manufacturing sand blast machinery, ventilating, dust collecting and sand handling equipment. Thomas W. Pangborn is president.

Personal

William H. Donner, president Cambria Steel Company, returned to Pittsburgh this week from Beaumaris, Canada, where he has spent the summer.

James A. Campbell, president Youngstown Sheet & Tube Company, Youngstown, Ohio, has gone to the Adirondacks on a vacation.

Samuel H. Whitaker, long identified with the Dayton Coal & Iron Company, now in the hands of a receiver, has connected himself with the sales department of Walter Wallingford & Co., Cincinnati, Ohio. Mr. Whitaker has been engaged in the sale of Southern pig iron almost from the time that such iron began to make a place for itself in Northern markets. He rose in the service of the Dayton Coal & Iron Company from the position of salesman to general manager of the business. It will be recalled that the failure of this company was not due to any developments in its own affairs but through entanglements with the bankrupt firm of James Watson & Co., Glasgow, Scotland.

W. J. Clark, secretary of the Upson Nut Company, and W. J. Fleming, assistant sales manager of the Bourne-Fuller Company, Cleveland, Ohio, started September 6 on a six weeks' trip to Yellowstone Park and California.

Reshen Hill, works manager of the Detroit Lubricator Company, Detroit, Mich., left September 4 for a six weeks' trip to Europe.

William Lodge, president Lodge & Shipley Machine Tool Company, Cincinnati, Ohio, arrived in New York from Europe September 5. He had been abroad on a combined business and pleasure trip that extended over several months.

Prof. John L. Shearer, president Ohio Mechanics Institute, Cincinnati, Ohio, has returned from Europe, where he spent several weeks on a vacation tour.

A. O. Galloway, assistant traffic manager of Rogers, Brown & Co., Cincinnati, Ohio, has resigned to accept a position as traffic manager of the Philip Carey Mfg. Company, Lockland, Ohio.

Carl Danielson, managing director of the Uddeholms Iron Works, Sweden, and who has been identified prominently with the Swedish iron industry practically all his life, was presented with the gold medal of the Jernkonforet by the Iron Works Association of Sweden at its last meeting. This was in recognition of his valuable services to the country's iron industry.

W. C. Runyon, president Struthers Furnace Company, Struthers, Ohio, sailed for Europe September 2.

H. H. Pleasance, formerly connected with the selling organization of the Cambria Steel Company, in its Cleveland and Detroit districts, is now associated with the United States Steel Company, Canton, Ohio, and is representing that company in its Cleveland territory.

W. W. Van Ausdall has been appointed sales engineer in charge of the special reversing planer motor department of the Triumph Electric Company, Cincinnati, Ohio.

L. J. Campbell, assistant to his father, James A. Campbell, president Youngstown Sheet & Tube Company, Youngstown, Ohio, has returned from a three months' stay in the Adirondacks, with his health fully restored.

R. L. Parrish, president Oriskany Ore & Iron Corporation, Lynchburg, Va., is in Europe.

J. G. Butler, Jr., Youngstown, Ohio, has returned from a brief trip to England. He participated in the dedication of the Southampton monument to the Pilgrims.

W. S. Chase, National Acme Mfg. Company, Cleveland, Ohio, sailed September 10 for an indefinite stay abroad on business.

William Jaeger, manager of the New York office of Alfred H. Schutte, Cologne, Germany, sailed for a visit to his home office September 10.

Prof. Richard Beck, of the school of mines, Freiberg, Saxony, Germany, was tendered a dinner in New York City, September 9, by some 20 alumni of the school, who took advantage of the presence in America of Prof. Beck, who had been participating in the International Geological Congress held last week in Ottawa and Toronto, to hold a reunion. Prof. Beck is an honorary member of the American Institute of Mining Engineers.

T. J. Driscoll, for the past year and a half connected with the engineering department of the Pittsburgh Crucible Steel Company, on the construction of its new plant at Midland, Pa., has been appointed chief draftsman, effective September 1. He was for seven years with the engineering department of the Pennsylvania Steel Company at Steelton, Pa., and previously with the Wellman-Seaver-Morgan Engineering Company on outside construction, and is a graduate of the Massachusetts Institute of Technology.

Albert E. Guy has terminated a two years' engagement with the Wilson-Snyder Centrifugal Pump Company, Pittsburgh, during which, as chief engineer for that company, he designed and established its complete lines of single and multi-stage centrifugal pumps for steam turbine and motor drive. While still retained by the company as consulting engineer, he leaves September 15 for Providence, R. I., where he will be connected as mechanical engineer with the Providence Engineering Works.

Charles M. Replogle, assistant superintendent of the steel car department of the Cambria Steel Company, Johnstown, Pa., has resigned to accept the position of general manager of the Ralston Steel Car Company, Columbus, Ohio, effective October 1.

H. E. Dickerman, sales agent for the Chisholm & Moore Mfg. Company, Cleveland, Ohio, who went abroad on business June 28, returned September 1. He had a successful trip and says there is an excellent field for his company's product in Europe. He visited practically every country except those directly involved in the Balkan war.

Albert C. Mann, Chicago, has been appointed purchasing agent of the Illinois Central and Yazoo & Mississippi Valley railroads, vice John C. Kuhns, resigned to engage in other business.

T. E. Jewell, 120 Milk street, Boston, has been appointed manager of the New England office of the C. & C. Electric & Mfg. Company, Garwood, N. J.

Obituary

HERMAN HEGELER, of Hegeler Brothers, zinc smelters, Danville, Ill., died August 30 in the German Hospital, Chicago. He was returning home from the Yellowstone Park, where he had gone in search of health. He was born in La Salle, Ill., January 7, 1872, the second son of the late Edward C. Hegeler, who came to America from Germany a half century ago and established at La Salle the Matthiessen & Hegeler Zinc Works. Mr. Hegeler graduated from Ann Arbor University, later spending two years at Cornell University in supplementary courses in engineering, after which he traveled abroad. He was associated with Matthiessen & Hegeler until 1905 when, with his brother Julius, he established at Danville the business which bears the family name. He leaves a widow and two children.

F. A. STEER, of St. Louis, died in London of pneumonia August 20, aged 67 years. He was for many years with Graff, Bennett & Co., Pittsburgh, manufacturers of iron, later formed the iron firm of Steer, Harrington & Co., and still later was with the Paddock-Hawley Iron Company, of St. Louis, now out of business.

CLEMENT W. HOOVEN, former president of the Anderson Tool Company, whose plant was recently moved from Anderson, Ind., to Hamilton, Ohio, died in a hospital at Battle Creek, Mich., August 29, aged 47 years. He leaves a widow, a daughter and a son.

HARRY A. MAY, president H. A. May Foundry Company, Philadelphia, Pa., was drowned September 1 while bathing at Wildwood, N. J.

E. L. King, receiver of the Pratt & Cady Company, Hartford, Conn., has accepted from Bishop White, West Hartford, an offer for the purchase of the assets, property and good will of the company, based on an option for six months from September 1, and which allows him to buy the property at any time on or before March 1, 1914. Although Mr. White's plans have not been perfected, it is his intention to prosecute the business vigorously.

Iron Mining Methods and Costs in Alabama

Some Contrasts with Practice on the Mesaba Range—Uncertainties of Brown Ore Deposits—New York State Concentrates

BY DWIGHT E. WOODBRIDGE†

Lest we forget that there are others in the United States than we of Lake Superior, who are doing things in iron mining, and other places than the Mesaba range where iron is mined and where records are made, I want to call attention to a few items from my note books. These items were gathered recently in work for the United States Government, as consulting engineer of the Bureau of Mines.

Low Brown Ore Costs

I found that in the brown ore regions of Alabama, they are mining an average of 7 or 8 cu. yd. of material for every ton of 50 to 52 per cent. ore, dried analysis, that they save. The Weems mine of brown ore, in the Rock Run district of Alabama, has mined 2,200,000 yd., and has secured 300,000 tons of ore; one ton to every 7 yd., plus. A company in that vicinity was mining, at the time of my visit, 15 yd. to get 1 ton. All this material has to be mined from the ore bank, transported to the washery, washed and loaded on cars, and the cost figure for this operation of 15 yd. to the ton was about \$1. Companies like the Republic Iron & Steel Company are buying brown ore of a guarantee of 45 per cent., dry, at \$1.35 a ton f.o.b. cars. The Roane Iron Company, of Chattanooga, contracts for brown ore at \$1 a ton when No. 2 foundry iron is selling at Birmingham at \$7, and a 5-cent premium for every dollar added to the price of pig iron until the ore has reached a maximum cost of \$1.50. That would make the Roane Company's brown ore cost it, now, about \$1.20. This is for a ton of 2268 lb., which is a weight used, I believe, nowhere else. The Woodward Iron Company figures its brown ore costs at about \$0.821 at the mine.

The Clinton Formation North and South

In the Clinton ore district of New York State, where the iron content of the ore is about 40 to 45 per cent. dry, they are removing an overburden that is from 10 to 20 ft. thick, half of it consisting of a hard limestone which must be blasted before removal by the shovels, in order to get at a thickness of about 2 ft. of ore. This ore dips flatly into the earth, and they are now trying to figure out how they will be able to follow the ore to a depth of 500 ft. vertically, underground. This will mean a distance of four or five miles from the outcropping. This Clinton ore district of New York State, about which we hear very little, and from which but a trifling quantity of ore is now taken, is estimated to contain not less than 500,000,000 tons of merchantable ore.

An underground mine in Etowah County, Alabama, on the Clinton formation, is successfully producing a 45 per cent. ore from a seam that averaged, at the time of my visit, 25.5 in. thick. Ore is successfully mined in this property to a thickness of 14 in. Miners get 55 cents a ton for ore in faces 36 in. thick, with a premium on thinner seams and a penalty on thicker. At this mine the ore is trammed underground in main galleries 48 in. high by "jennies" whose ears seem to have been cropped to fit the openings, is hoisted to the main tunnel level on platforms up an incline, is trammed out to surface by mules and run through a crusher and over a picking belt to remove slate, and the picked ore is then let down a long incline to the railroad track. The cost of all these operations was averaging, at the time I saw the mine, about \$1.40 per ton of picked ore, this figure including all overhead costs as well as transportation to the furnace and amortization.

Generally accepted figures on the tonnage of Clinton

ores available in that part of Alabama between Birmingham and the suburb of Bessemer have been for about 800,000,000 tons of the better grade, or "self-fluxing" ore. But by virtue of a drill hole sunk last year by Cole McDonald, of Duluth, this figure should be double, as the probable ore. This drill hole went vertically 1902 ft. to the top of the "big seam" of Clinton ore, that outcrops 14,500 ft. away. At the outcrop of the "big seam" it shows a thickness of some 12 ft., but at this point some three miles back from the outcrop, and 1900 ft. deep, the ore shows a combined thickness of 15 ft. in two seams parted by 2 ft. of slate. It is probable that there is as much good ore between Birmingham and Bessemer, an extreme length of about 20 miles, as there is on the Mesaba range, and that there is about as much merchantable ore of the Clinton hematites in Alabama as of all merchantable ores in the Lake Superior region. And lest we forget the comparative value of these ores, let us bear in mind that a 40 per cent. hard Clinton hematite of Alabama is as good for furnace use as a 50 per cent. Mesaba hematite, on account of its comparative freedom from moisture and its high percentage of carbonate of lime.

Brown Ore Distribution

The distribution of brown ore banks throughout the United States is far wider than that of any other type of iron-bearing material. These banks occur in the States of Vermont, Massachusetts, Connecticut, New York, Pennsylvania, Maryland, Georgia, Tennessee, Alabama, Kentucky, Missouri, Texas, Iowa and Wisconsin. They are mined in Pennsylvania, Virginia, Tennessee, Georgia, Alabama, Texas, Iowa and Missouri; chiefly in Alabama and Georgia. That they are some factor to be reckoned with in the future may be gathered when I say that there are areas of these banks in Alabama alone covering 7000 square miles. No estimates of tonnages that are worthy of credence have ever been made, and it is impossible to make such estimates, on account of the uncertainty of the deposits. It is a common saying in the South that no man can see into a brown ore bank further than the end of his pick. But it is not unlikely that the deposits of these ores in the Southern States of Virginia, Tennessee, Georgia and Alabama will be found ultimately to be of enormous quantity.

In the Clinton ore mines of Birmingham some of the mining companies pay their miners on the basis of 30 cents a ton for ore. This means the breaking of the ore, loading in tramcars, and the delivery of the cars to the main heading, where the cars are picked up by the company and pulled to the tippie at surface. In these cases the company furnishes drills, air and steel; the contractor, usually a negro, supplies labor and powder. Some companies pay less than 30 cents a ton. The pig-iron costs of one of the large mining and iron making companies of the district, with the elimination of all intermediate profits, and by the use of by-product coke, have been under \$6.50 a ton, and can now be figured at about \$7. Possibly there are others that can not do so well.

In the case of one of the operating companies of the district, the assemblage of materials is on the following basis: It owns a strip of land four miles long and about a mile wide. At one end of this strip are its ore mines, as good as can be found on Red Mountain. At the other end are its coal entries. In the center are its furnaces. Connecting all is a standard gauge railroad laid with 100-lb. steel, and using cars of 140,000-lb. capacity. This road connects at points less than a mile from the furnaces, with ten trunk lines of railroad. Another operating company starts the incline track carrying ore to its furnace mouths in a quarry of limestone suitable for flux. The advantage of this condition is neutralized, however, by the fact that none of these companies uses any flux to speak

*A paper with the title "What Our Neighbors Can Do in Mining Iron Ore," read at the Minnesota meeting of the Lake Superior Mining Institute, August 26-30, 1913.

†Consulting engineer, Duluth, Minn.

Another company has six great blast furnaces in a row, some of them of 500 tons per day capacity.

Disappearance of Maryland Ores

There are in Maryland four blast furnaces of a daily capacity of about 350 tons of coke pig iron each. All the iron produced in that State is made in these stacks. Fifty years ago Maryland had no less than 31 active furnaces and their combined capacity was 70,000 tons a year, as much as the four now in blast can make in two months. All those old stacks, which averaged about six tons of iron per day, and whose ruins now dot the State, produced iron from brown ore banks that were then active, and all of which lay within a few miles of the stacks. In these days there were many stacks in the city of Baltimore and the ore to run them was mined within 30 miles of the city. Now those ore banks are deserted, and the great furnaces near Baltimore receive their ore supplies from foreign mines situated more than 1000 miles away on the Caribbean sea. The Lake Superior district is largely responsible for this and other similar changes in the iron trade.

In New York State there are large deposits of low grade magnetites running, say, 40 per cent. iron and up to 10 per cent. phosphorus, that are being made into a very high grade Bessemer ore by the elimination of the combined apatite, which is the mineral carrying the phosphorus. They have produced so far, of New York magnetic ores from this Appalachian field, more than 35,000,000 tons, showing it to be a most important field. At Pineville they are now concentrating these 2 per cent. phosphorus ores at the rate of 1,000,000 tons a year, which is the capacity of their mills when working one shift per day. In these mills they are bringing their 40 per cent. ore up to 65 per cent., and their 2 per cent. of phosphorus they are reducing to 0.03 per cent., and they are making a product that does not vary from one month to another more than 0.004 or 0.005 per cent. in its phosphorus content. Such close work seems almost uncanny. When one considers the vast probabilities of low grade magnetic ores on Lake Superior, now unused, he appreciates the possibilities of such applications to the reserves of this region.

Briquetting Pitch from Coke Oven Tar

A Description of the Cava Process— High Binding Properties and Low Cost

The advantageous employment of all the products of the coke oven gas is constantly being studied and new suggestions are being offered. Gevers-Orban, of Liège, Belgium, discussed one important phase of this subject in a paper before the Brussels meeting of the Iron and Steel Institute, entitled, "The Distillation of Tar in Metallurgical Practice." After stating that, because of the importance of the by-products of coking to the iron industry, coke ovens are now so far as possible located at the steel plants instead of near the collieries, he enumerates the various by-products:

1. The coke oven gas used as a motive power.
2. The coke oven gas as an ideal fuel for open-hearth furnaces.
3. The coke oven tar is readily converted into steel works tar for use in converter linings.
4. The distillation of the tar furnishes the oils required in the heating or reheating, annealing and hardening furnaces.
5. The distillation of the tar furnishes a cheap binder for the agglomeration of ore dust into briquettes.

The author deals particularly with the last by-product mentioned and explains in detail a new process for the cheap production of valuable distillates of coke oven tars. He says:

The Utilization of the Tar

The treatment of the tar is carried out wholly in distilleries. Hitherto these have been costly, inconvenient, and dangerous plants, requiring the services of a special staff. A distillery for dealing with 6000 tons of tar is estimated as costing £6000 to install. In these circumstances it is not surprising that coke manufacturers at the present day seldom concern themselves with the distillation of their own tars. Now, however, the Cava process, in operation at the Espérance Bonne-Fortune

Collieries, at Montegnée, Liège, supplies a simplified means of dealing with the tar question.

At the Bonne-Fortune works, which are capable of dealing with 24 tons daily, or 8000 tons per annum, the tar enters at one end of a horizontal boiler retort 6 m. in length and 1.50 m. in diameter, which is half filled. Within this boiler the tar slowly travels, becoming gradually heated during its journey forward, while large blades, fixed to a horizontal shaft, plunge into the bath and expose thin layers of the tar to the oxidizing and evaporating action of a brisk current of air. When the tar has reached the front part of the boiler it has become a pitch, at a temperature of 200 deg. to 250 deg. C., according as it is desired to obtain a moister or a drier pitch; whereas, in the ordinary retorts, the temperature exceeds 360 deg. C.

The pitch trickles from the retort, by gravity, continuously through a spiral cooler, and attains a temperature of 90 deg. C., either in the pitch tanks, tank cars, or in some sort of mold. At the Bonne-Fortune works the tar undergoes in addition a preliminary oxidation by means of a current of ozonized air in an ozonizing chamber. This additional oxidation is applied with the sole object of increasing the yield of pitch, as the works have been specially built to supply pitch for a coal-briquetting plant.

Advantages of the Cava Process

The advantages realized in the Cava process over the distillation in ordinary retorts are threefold.

1. The operation is continuous. The tar enters continuously at one end of the boiler and the pitch flows continuously from the other end, while the oils of distillation pass off continuously through a spiral placed on top of the boiler. The temperature in every part of the boiler and throughout the mass remains therefore constant and the wear of the boiler is insignificant, whereas the ordinary retorts wear rapidly owing to the high and fluctuating temperatures to which they are subjected. The efficiency of the boiler is three times as high as that of an ordinary retort of the same capacity, as it need never be emptied nor refilled nor reheated after having cooled down. Considerably less labor is also required owing to these causes.

2. In the Cava boiler distillation is, as a matter of fact, superseded by evaporation; that is to say, the air current sweeps over the large moving surfaces covered with tar, and carries off from them the lighter products. This evaporation takes place at a much lower temperature than the distillation and, further, the vapors are carried away mechanically by the air current, whereas in the ordinary process of distillation the mechanical energy expended in driving off the hydro-carbon vapors has to be supplied by the furnace. The result of the low temperature involved is a low coal consumption, diminished wear in the retort boiler, and reduced danger of fire during the distillation.

3. The air current, by circulating within the boiler, effects an oxidation which increases the proportion of the bituminous products, and consequently increases to the extent of 25 per cent. the binding qualities of the pitch, which thereby acquires greater commercial value, as for the briquetting of coal dust or ore dust.

As the result of these three advantages a Cava distillery with a capacity of 6000 tons of tar per annum costs only £2400, while an ordinary distillery would cost from £6000 to £8000.

The Bonne-Fortune distillery occupies a building only 6 m. wide, 6.50 m. in length, and 7 m. in height. Such a distillery would form a simple and profitable adjunct to every coke oven plant.

The Cava retort boiler lends itself readily to the preparation of pitch for steel works uses. For this purpose the apparatus is worked for a larger output and a lower temperature, so as to remove only the ammoniacal liquors and the lightest by-products, while the problem of briquetting blast furnace ores presents itself in a new light by the adoption of the process.

This briquetting can certainly be carried out with ordinary pitch, but the latter cannot be used, as it is too expensive, and also because too large quantities have to be employed. Dr. Weiskopf, in a report to the Bergmannstag of Vienna in September, 1912, showed that at Walsun (Westphalia) and at Frankfort-on-Main good results had been obtained with cellulose pitch (Zellpech), but that this pitch was too costly and too scarce on the mar-

ket. Now Cava pitch, which possesses 25 per cent. higher binding properties than any other pitch and can be obtained at but little cost from coke works, appears specially suitable for the agglomeration of fine ores. It also possesses the property of forming a homogeneous mixture with one-third its weight of lime sludge, while this mixture has the same binding properties as Cava pitch, is even less expensive, and introduces into the blast-furnaces a valuable fluxing agent.

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United Engineering & Construction Company

The United Engineering & Construction Company, Cleveland, Ohio, has been organized to engage in engineering work that will cover the mechanical, electrical, architectural and civil engineering fields. Associated with the company are a number of men who have had a great deal of experience in various fields of engineering work. The company will have its main offices in the Schofield Building, Cleveland, and will shortly establish branch offices in New York, Detroit and Buffalo.

The company has been chartered as an Ohio corporation with a capitalization of \$100,000. Its officers are as follows: President, R. W. Rose, formerly with the Mannheim Construction Co., New York; treasurer and general manager, Theodore Rodmann, formerly connected with the General Electric Company, Westinghouse Electric Mfg. Company and Otis Elevator Company; secretary, R. W. Cavanaugh, recently with the Cleveland office of Manning, Maxwell & Moore; general sales manager, L. B. Mesker, recently manager of the St. Louis office of Manning, Maxwell & Moore, and previously connected with the Cleveland office of that firm; chief engineer, R. W. Grace, formerly connected with the Platt Iron Works, Bucyrus Steam Shovel Company and Marion Steam Shovel Company; assistant engineer, George Ellspass, recently connected with the engineering department of the Lake Shore Railroad; chief draftsman, J. M. O'Donnell. John H. Hezlep, formerly with engineering companies in Pittsburgh, will also be associated with the company, which already has considerable engineering work on hand.

Foreign Competition for Navy Turbine Drums

WASHINGTON, D. C., September 9, 1913.—Secretary of the Navy Daniels is extremely pleased over bids which have been submitted for turbine drums intended to be used on battleship No. 39. Three bids were received, two from American makers and one from a foreign firm. Secretary Daniels, it is believed, will accept the foreign bid as he states that there is nothing in the law providing for the building of the battleship to limit the material in that ship to domestic sources of supply. Formerly such a restriction was incorporated in the naval appropriation act.

The American bidders were the Midvale and Bethlehem Steel companies, and the foreign bidder was Cammell Laird & Co., of England. The Midvale Company bid \$1.35 per lb., the Bethlehem Company \$1.40, and the foreign bidder 45 cents. The contract will amount to \$52,000 on the basis of the foreign bid, and Secretary Daniels states that he can save about \$100,000 by accepting it. Within the next few days he is likely to give out an extended statement on the subject of these bids.

W. L. C.

The Mitchell-Lewis Motor Company, Racine, Wis., has been handed over to its stockholders after a year of operation under the direction of the bankers who provided working funds. At the meeting of the board of directors last week, the resignation of Joseph M. Winterbotham, Jr., as president was accepted. Mr. Winterbotham, as a representative of the bankers on the executive board, was elected president to succeed Capt. William Mitchell Lewis last spring. The new president, also general manager, is Beach L. McLaren, until now president of the Racine Rubber Company, Racine. John W. Bate, for many years production manager for the Mitchell-Lewis Company, was elected first vice-president and general factory manager. William T. Lewis, father of Captain Lewis, and until now chairman of the board of directors, was elected second vice-president. H. E. Redman continues as secretary and Frank L. Mitchell as treasurer. The plant is employing more than 2000 men at this time and is operating at full capacity.

The Eller Mfg. Company, Canton, Ohio, maker of formed roofing products, expects to move about November 1 into its new plant, which has been under construction for a year. The building is a brick and steel fireproof structure, 280 x 300 ft., providing practically two acres of floor space. The plant will be one of the most complete in the country for the manufacture of sheet metal products.

American Boiler Manufacturers' Convention

Proceedings of Twenty-fifth Annual Meeting,
Held in Cleveland, Ohio, September 1 to 4,
1913—Will Meet in New York City in 1914

Brief reference was made on page 517 of *The Iron Age* September 4 to the annual meeting in Cleveland, Ohio, the American Boiler Manufacturers' Association.

At the session in the Hollenden Hotel on Tuesday morning, September 2, President E. D. Meier stated that the National Association of Tubular Boiler Manufacturers, in holding a meeting in the same hotel, had been invited to be present to hear the report of the Committee on Uniform Boiler Specifications as its assistance and cooperation are desired in the work for the adoption of uniform boiler specifications and legislation to that end. The members of the National Tubular Boiler Manufacturers' Association, headed by President C. V. Kellogg, of Chicago, entered the room and were cordially received. President Kellogg, being called upon, spoke in part as follows:

Aims of Tubular Boiler Manufacturers' Association

"We have formed an association of manufacturers interested more particularly in the commercial line of tubular boilers. We found on investigation that there was a growing agitation on the part of legislatures and city councils to pass laws or ordinances in reference to the construction of tubular goods and also in reference to their inspection. We found that if the laws which were introduced in legislatures were enacted it would be impossible to manufacture our goods in advance. Our members therefore felt that it was necessary to formulate something that was applicable to the practical commercialism of the goods although not pertaining so much to the technical part of the manufacture. We found also that in figuring on a specification that there were being written so many specifications by people perhaps who were not enough familiar with the technical knowledge or the commercialism of a boiler that it was impossible for two or three or four people to figure according to the specifications as given to them and deliver a perfect article. We also found that the manufacturers who were figuring would come back with specifications of their own make, and the result was that there was so much variance in reference to trade conditions that it was impossible for the manufacturers not to be misled by the buyers, so that from a practical standpoint it was necessary for the manufacturers who were operating in that line to get together more closely and to have a common basis for their policy and methods of business, that is, so far as the commercial or practical specifications were required.

"We met and we have worked upon the problem for nearly a year; and after very careful consideration 34 companies have made up and adopted what they call standard specifications for simply horizontal return tubular boilers. We found also, that in several States, such as Indiana, Montana, Michigan, California, Illinois and Missouri, legislation was pending requiring the inspection of tubular goods. The intent of some of the legislation seemed, was to place too large powers in the hands of boards who might thereafter make laws and rules unto themselves as to what would be required of the manufacturers; and it was our judgment that if that condition continued without some action on the part of the manufacturers who were vitally interested, it would be absolutely impossible for any manufacturer to carry on his business and know what he was doing or what he intended to do in any given locality. So we have started in to take up with the different bodies endeavoring to pass such laws the questions involved; and we have succeeded in having a law passed in Indiana which was on the line of the specifications we have adopted. In several of the other States we succeeded in having bills that were introduced defeated, while in others they were held over for further consideration. We do not object to a fair law, so long as we are informed what it is, but if every State and every city passes a law unto itself and they are all different, how are we going to purchase the materials, how are we going to carry on a manufacturing business? We

would be subjected to an increased expense, either in carrying charges or otherwise which would have to be borne by the user in the end."

Addresses were delivered by C. H. Wirmel, chief inspector of the Board of Boiler Rules of Ohio, Columbus, Ohio; H. A. Baumhart, manager Hartford Steam Boiler Inspection Company, Cleveland, Ohio, and a number of members of the association.

Uniformity of Boiler Specifications Recommended

The Committee on Uniform Boiler Specifications, consisting of Col. E. D. Meier, chairman; T. M. Rees, Bartholomew Scannell, Henry J. Huntley, A. J. Schaff and L. E. Connelly, presented its report, the conclusion of which is as follows:

Your committee has become convinced of and earnestly recommends to you the necessity of dividing the subject into two parts, each of which demands your attention and energy, but in a different manner.

1. To formulate and press for adoption in all the States a simple short law embodying the general provisions for honest and safe construction, inspection and care of boilers and all other vessels subject to internal pressure.

2. To recommend to all builders and users of boilers, and especially also to any boards of inspectors in the United States, in individual States and municipalities, the adoption of fair clear rules modeled after the Massachusetts and Ohio rules and the regulations of the Steamboat Inspection Service.

The boiler law should not go into details but concern itself with well-established principles only and provide for the appointment and discipline of a board of inspectors intrusted with the duty and power to establish and modify rules and regulations covering all details. The enactments of this board to be subject to debate and criticism at public hearings at fixed dates each year, 60 days' notice of any proposed change having been previously given, and the final action to be subject to the approval of an executive officer, named in the law, to give them legal effect.

Such a uniform boiler law could well be evolved from the excellent boiler laws of Massachusetts and Ohio, simplifying as much as possible, and leaving the name and manner of appointment of the board of rules to local preference.

There exists now an association for unifying the laws of the different States, called the Conference of Commissioners on Uniform State Laws. One of our members, L. E. Connelly, has attended one of their meetings as our delegate and found them willing to take this subject up actively as soon as we give them a definite statement of our requirements.

The rules as established in Massachusetts and Ohio are finding general approval and are made part of specifications in many contracts outside of these States. Engineers and manufacturers are studying them with a view to further improvement and simplification. A very thorough study of them has been under way for the last two years by a committee of experts of the American Society of Mechanical Engineers of which Mr. Stevens, until recently the mechanical engineer of the Massachusetts Board, is chairman, and two members of which belong to the American Boiler Manufacturers' Association. It is, therefore, certain that these rules will be much improved during the next few years. This part of the work should be continued by this committee in co-operation with other bodies having similar purpose.

The committee should be instructed to communicate to the boards of boiler rules of Massachusetts and Ohio and to other kindred bodies the modifications recommended in this report and in that of March 14, 1912.

The matter of the uniform boiler law would be placed in the care of a special committee of five members, instructed to formulate such a law as outlined above in collaboration and agreement with the commission on uniform laws above referred to.

In this work we need the assistance, in fact the collaboration, of men versed in the law and devoted to uniformity, to dress our conclusions in proper legal phraseology.

After considerable discussion the report was adopted.

Tuesday Afternoon's Session

An extended discussion followed the reading of a paper on "Factory Efficiency" by Lucian I. Yeomans, industrial engineer, Chicago. He attacked so-called "scientific management," stating that he had been unable to find in it one single new element of efficiency and that many of our

ket. Now Cava pitch, which possesses 25 per cent. higher binding properties than any other pitch and can be obtained at but little cost from coke works, appears specially suitable for the agglomeration of fine ores. It also possesses the property of forming a homogeneous mixture with one-third its weight of lime sludge, while this mixture has the same binding properties as Cava pitch, is even less expensive, and introduces into the blast-furnaces a valuable fluxing agent.

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United Engineering & Construction Company

The United Engineering & Construction Company, Cleveland, Ohio, has been organized to engage in engineering work that will cover the mechanical, electrical, architectural and civil engineering fields. Associated with the company are a number of men who have had a great deal of experience in various fields of engineering work. The company will have its main offices in the Schofield Building, Cleveland, and will shortly establish branch offices in New York, Detroit and Buffalo.

The company has been chartered as an Ohio corporation with a capitalization of \$100,000. Its officers are as follows: President, R. W. Rose, formerly with the Mannheim Construction Co., New York; treasurer and general manager, Theodore Rodmann, formerly connected with the General Electric Company, Westinghouse Electric Mfg. Company and Otis Elevator Company; secretary, R. W. Cavanaugh, recently with the Cleveland office of Manning, Maxwell & Moore; general sales manager, L. H. Mesker, recently manager of the St. Louis office of Manning, Maxwell & Moore, and previously connected with the Cleveland office of that firm; chief engineer, R. W. Grace, formerly connected with the Platt Iron Works, Bucyrus Steam Shovel Company and Marion Steam Shovel Company; assistant engineer, George Ellsper, recently connected with the engineering department of the Lake Shore Railroad; chief draftsman, J. M. O'Donnell. John H. Hezlep, formerly with engineering companies in Pittsburgh, will also be associated with the company, which already has considerable engineering work on hand.

Foreign Competition for Navy Turbine Drums

WASHINGTON, D. C., September 9, 1913.—Secretary of the Navy Daniels is extremely pleased over bids which have been submitted for turbine drums intended to be used on battleship No. 39. Three bids were received, two from American makers and one from a foreign firm. Secretary Daniels, it is believed, will accept the foreign bid as he states that there is nothing in the law providing for the building of the battleship to limit the material in that ship to domestic sources of supply. Formerly such a restriction was incorporated in the naval appropriation act.

The American bidders were the Midvale and Bethlehem Steel companies, and the foreign bidder was Cammell Laird & Co., of England. The Midvale Company bid \$1.31 per lb., the Bethlehem Company \$1.40, and the foreign bidder 45 cents. The contract will amount to \$52,000 on the basis of the foreign bid, and Secretary Daniels states that he can save about \$100,000 by accepting it. Within the next few days he is likely to give out an extended statement on the subject of these bids. W. L. C.

The Mitchell-Lewis Motor Company, Racine, Wis., has been handed over to its stockholders after a year of operation under the direction of the bankers who provided working funds. At the meeting of the board of directors last week, the resignation of Joseph M. Winterbotham, Jr., as president was accepted. Mr. Winterbotham, as a representative of the bankers on the executive board, was elected president to succeed Capt. William Mitchell Lewis last spring. The new president, also general manager, is Beach L. McLaren, until now president of the Racine Rubber Company, Racine. John W. Bate, for many years production manager for the Mitchell-Lewis Company, was elected first vice-president and general factory manager. William T. Lewis, father of Captain Lewis, and until now chairman of the board of directors, was elected second vice-president. H. E. Redman continues as secretary and Frank L. Mitchell as treasurer. The plant is employing more than 2000 men at this time and is operating at full capacity.

The Eller Mfg. Company, Canton, Ohio, maker of formed roofing products, expects to move about November 1 into its new plant, which has been under construction for a year. The building is a brick and steel fireproof structure, 280 x 300 ft., providing practically two acres of floor space. The plant will be one of the most complete in the country for the manufacture of sheet metal products.

American Boiler Manufacturers' Convention

Proceedings of Twenty-fifth Annual Meeting,
Held in Cleveland, Ohio, September 1 to 4,
1913—Will Meet in New York City in 1914

Brief reference was made on page 517 of *The Iron Age* September 4 to the annual meeting in Cleveland, Ohio, of the American Boiler Manufacturers' Association.

At the session in the Hollenden Hotel on Tuesday morning, September 2, President E. D. Meier stated that the National Association of Tubular Boiler Manufacturers, then holding a meeting in the same hotel, had been invited to be present to hear the report of the Committee on Uniform Boiler Specifications as its assistance and cooperation are desired in the work for the adoption of uniform boiler specifications and legislation to that end. The members of the National Tubular Boiler Manufacturers' Association, headed by President C. V. Kellogg, of Chicago, then entered the room and were cordially received. President Kellogg, being called upon, spoke in part as follows:

Aims of Tubular Boiler Manufacturers' Association

"We have formed an association of manufacturers interested more particularly in the commercial line of tubular boilers. We found on investigation that there was a growing agitation on the part of legislatures and city councils to pass laws or ordinances in reference to the construction of tubular goods and also in reference to their inspection. We found that if the laws which were introduced in legislatures were enacted it would be impossible to manufacture our goods in advance. Our members therefore felt that it was necessary to formulate something that was applicable to the practical commercialism of the goods though not pertaining so much to the technical part of the manufacture. We found also that in figuring on a boiler a specification that there were being written so many specifications by people perhaps who were not enough familiar with the technical knowledge or the commercialism of a boiler that it was impossible for two or three or four people to figure according to the specifications as given to them and deliver a perfect article. We also found that the manufacturers who were figuring would come back with specifications of their own make, and the result was that there was so much variance in reference to trade conditions that it was impossible for the manufacturers not to be misled by the buyers, so that from a practical standpoint it was necessary for the manufacturers who were operating in that line to get together more closely and to have a common basis for their policy and methods of business, that is, so far as the commercial or practical specifications were required.

"We met and we have worked upon the problem for nearly a year; and after very careful consideration 34 companies have made up and adopted what they call standard specifications for simply horizontal return tubular boilers. We found also, that in several States, such as Indiana, Montana, Michigan, California, Illinois and Missouri, legislation was pending requiring the inspection of tubular goods. The intent of some of the legislation, it seemed, was to place too large powers in the hands of boards who might thereafter make laws and rules upon themselves as to what would be required of the manufacturers; and it was our judgment that if that condition continued without some action on the part of the manufacturers who were vitally interested, it would be absolutely impossible for any manufacturer to carry on his business and know what he was doing or what he intended to do in any given locality. So we have started in to take up with the different bodies endeavoring to pass such laws the questions involved; and we have succeeded in having a law passed in Indiana which was on the line of the specifications we have adopted. In several of the other States we succeeded in having bills that were introduced defeated, while in others they were held over for further consideration. We do not object to a fair law, so long as we are informed what it is, but if every State and every city passes a law unto itself and they are all different, how are we going to purchase the materials, how are we going to carry on a manufacturing business? We

would be subjected to an increased expense, either in carrying charges or otherwise which would have to be borne by the user in the end."

Addresses were delivered by C. H. Wirmel, chief inspector of the Board of Boiler Rules of Ohio, Columbus, Ohio; H. A. Baumhart, manager Hartford Steam Boiler Inspection Company, Cleveland, Ohio, and a number of members of the association.

Uniformity of Boiler Specifications Recommended

The Committee on Uniform Boiler Specifications, consisting of Col. E. D. Meier, chairman; T. M. Rees, Bartholomew Scannell, Henry J. Huntley, A. J. Schaff and L. E. Connelly, presented its report, the conclusion of which is as follows:

Your committee has become convinced of and earnestly recommends to you the necessity of dividing the subject into two parts, each of which demands your attention and energy, but in a different manner.

1. To formulate and press for adoption in all the States a simple short law embodying the general provisions for honest and safe construction, inspection and care of boilers and all other vessels subject to internal pressure.

2. To recommend to all builders and users of boilers, and especially also to any boards of inspectors in the United States, in individual States and municipalities, the adoption of fair clear rules modeled after the Massachusetts and Ohio rules and the regulations of the Steamboat Inspection Service.

The boiler law should not go into details but concern itself with well-established principles only and provide for the appointment and discipline of a board of inspectors intrusted with the duty and power to establish and modify rules and regulations covering all details. The enactments of this board to be subject to debate and criticism at public hearings at fixed dates each year, 60 days' notice of any proposed change having been previously given, and the final action to be subject to the approval of an executive officer, named in the law, to give them legal effect.

Such a uniform boiler law could well be evolved from the excellent boiler laws of Massachusetts and Ohio, simplifying as much as possible, and leaving the name and manner of appointment of the board of rules to local preference.

There exists now an association for unifying the laws of the different States, called the Conference of Commissioners on Uniform State Laws. One of our members, L. E. Connelly, has attended one of their meetings as our delegate and found them willing to take this subject up actively as soon as we give them a definite statement of our requirements.

The rules as established in Massachusetts and Ohio are finding general approval and are made part of specifications in many contracts outside of these States. Engineers and manufacturers are studying them with a view to further improvement and simplification. A very thorough study of them has been under way for the last two years by a committee of experts of the American Society of Mechanical Engineers of which Mr. Stevens, until recently the mechanical engineer of the Massachusetts Board, is chairman, and two members of which belong to the American Boiler Manufacturers' Association. It is, therefore, certain that these rules will be much improved during the next few years. This part of the work should be continued by this committee in co-operation with other bodies having similar purpose.

The committee should be instructed to communicate to the boards of boiler rules of Massachusetts and Ohio and to other kindred bodies the modifications recommended in this report and in that of March 14, 1912.

The matter of the uniform boiler law would be placed in the care of a special committee of five members, instructed to formulate such a law as outlined above in collaboration and agreement with the commission on uniform laws above referred to.

In this work we need the assistance, in fact the collaboration, of men versed in the law and devoted to uniformity, to dress our conclusions in proper legal phraseology.

After considerable discussion the report was adopted.

Tuesday Afternoon's Session

An extended discussion followed the reading of a paper on "Factory Efficiency" by Lucian I. Yeomans, industrial engineer, Chicago. He attacked so-called "scientific management," stating that he had been unable to find in it one single new element of efficiency and that many of our

foremost writers on the subject have based their investigations on some little trick of time-saving importance new to them, and which they assumed was new to all. He announced himself as joined to that conservative element which defines scientific management as "the best use of the present means." Conditions of management were analyzed and practical suggestions made. He attacked profit sharing, declaring that the reward is too remote to be effective. The discussion brought out interesting recitals of experiences in managing men.

The paper read by Thomas E. Durban, general manager of the Erie City Iron Works, Erie, Pa., on "Uniform Boiler Specifications," printed elsewhere in this issue, was well received. It was characterized by President Meier as greatly strengthening the position of the association on this important subject.

W. C. Connelly, president D. Connelly Boiler Company, Cleveland, Ohio, next read a paper on "Shop Costs" which elicited much discussion and resulted in the adoption of a resolution directing the president to appoint a committee on a uniform cost system. The president stated that he would take a little time to consider the naming of the members to serve in that capacity.

Wednesday was set apart for a steamboat trip on Lake Erie and no meeting was held on that day.

Thursday's Session

After the Auditing Committee made its report, the Committee on Time and Place presented its report recommending New York City as the place for holding the next convention, some time in September, 1914, which was adopted.

The Committee on Nominations presented the following list and all were elected unanimously:

President, E. D. Meier, New York, N. Y.
 Secretary, J. D. Farasey, Cleveland, Ohio.
 Treasurer, Jos. F. Wangler, St. Louis, Mo.
 First vice-president, T. M. Rees, Pittsburgh, Pa.
 Second vice-president, J. Don Smith, Charleston, S. C.
 Third vice-president, H. D. MacKinnon, Bay City, Mich.
 Fourth vice-president, L. E. Connelly, Cleveland, Ohio.
 Fifth vice-president, R. Joy, Oswego, N. Y.

Interesting responses were made by the several officers in reply to the notification of their election. Some of them made suggestions regarding the work to be undertaken by the association that will doubtless bear good fruit. The convention then adjourned.

The Banquet

The usual annual banquet was held at the Hotel Hollenden on Thursday evening. The committee in charge of the arrangements consisted of the following: W. H. S. Bateman, chairman; W. O. Duntley, Thomas Aldcorn, J. T. Corbett, D. J. Champion, J. D. Farasey.

President Meier acted as toastmaster. The speakers were M. P. Mooney, of Cleveland, whose subject was "Standardization"; Capt. M. B. Nelson, supervising inspector Ninth District, Cleveland, Ohio, "Co-operation Between the Boiler Manufacturer and the Inspector"; D. J. Champion, vice-president Champion Rivet Company, Cleveland, Ohio, "Friendly Relations Between Boiler Manufacturers and Supply Men"; W. O. Duntley, president Chicago Pneumatic Tool Company, Chicago, who made a witty speech, which wound up with the presentation of a solid silver pitcher to Thomas Aldcorn, of New York City, in behalf of the associate members of the association; W. C. Connelly, who spoke for the younger members; W. H. S. Bateman, who paid a feeling tribute to Harry B. Hare and J. F. Duntley, members who died in the past year.

Officers of Associate Members

The following officers of this body were elected September 4:

President, J. T. Corbett, J. T. Ryerson & Son, Chicago, Ill.

Vice-president, Thomas Aldcorn, Chicago Pneumatic Tool Company, New York City.

Treasurer, D. J. Champion, Champion Rivet Company, Cleveland, Ohio.

Secretary, F. B. Slocum, Continental Iron Works, Brooklyn, N. Y.

Executive Committee, W. O. Duntley, chairman, president Chicago Pneumatic Tool Company, Chicago, Ill.; W. H. S. Bateman, sales agent, Champion Rivet Company, Philadelphia, Pa.; D. J. Champion, vice-president and gen-

eral manager Champion Rivet Company, Cleveland, Ohio; George W. Denyven, Arthur C. Harvey & Co., Boston, Mass.; George H. Partridge, advertising manager, of Engineering Catalogue, New York City; A. M. Muel, Joseph T. Ryerson & Son, Chicago, Ill.

Compressed Air Tank Inspection in Massachusetts

George A. Luck, chairman of the board of boiler rules of Massachusetts and chief deputy of the boiler inspection department of that State, brought to the attention of members of the American Boiler Manufacturers' Association in Cleveland last week the recently enacted Massachusetts statute relating to the construction and inspection of tanks for the storage of compressed air for the use of pneumatic machinery which went into effect August 1. Its text is as follows:

1. No person shall install or use, or cause to be installed or used, any tank or other receptacle exceeding 18 in. in diameter for keeping or storage of compressed air at any pressure exceeding 15 lb. per sq. in. for use in operating pneumatic machinery, unless owner or user thereof shall hold a certificate of inspection issued by the boiler inspection department of the district police, certifying that the said tank or other receptacle has been duly inspected within two years, or unless the owner or user shall hold a policy of insurance upon the said tank or other receptacle issued by an insurance company operating under the laws of this commonwealth, together with a certificate of inspection from an insurance inspector.
2. The board of boiler rules shall prescribe regulations for the size, shape, construction, operation, maximum pressure, gauges, valves, device and other appurtenances necessary for the safe operation of all tanks or other receptacles used for the storage of compressed air, except those exempted in section 7 of this act.
3. The boiler inspection department of the district police shall inspect all of the said tanks or other receptacles exceeding 18 in. in diameter and in excess of 50 lb. pressure per sq. in. at least once every two years: provided, however, that the said department shall not be required to inspect such tanks or other receptacles as may be covered by a policy of insurance and inspected by insurance inspectors.
4. All owners of any of the said tanks or other receptacles exceeding 18 in. in diameter and in excess of 50 lb. pressure per sq. in. shall notify the chief of the district police of the location of the same.
5. Every insurance company authorized to insure air tanks within this commonwealth shall forward to the chief of the district police within 14 days after each internal and external inspection of an air tank or other such receptacle a report of such inspection. The reports shall be made on blanks furnished by the chief of the district police, and shall contain all orders and regulations made by the board of boiler rules regarding the air tanks or other receptacles so inspected.
6. The inspection shall consist of a hammer test, and also a hydrostatic test, the pressure of which shall be one and one-half times the pressure allowed on the air tank or other receptacle inspected. The air tank or other receptacle shall be prepared for inspection by the owner or user thereof.
7. The provisions of this act shall not apply to tanks or other receptacles used for the keeping or storage of compressed air which are attached to locomotives, street or railroad cars, vessels or motor vehicles.
8. The sum of \$3 shall be paid to the boiler inspection department of the district police by the owner or user of any such tank or other receptacle for every inspection thereof by the said department here provided for.
9. Whoever violates any provision of this act, or any regulation made under authority hereof, shall be punished by a fine not exceeding \$50, or by imprisonment for not more than 30 days, or by both such fine and imprisonment.

Mr. Luck explained that this law only refers to compressed air used for pneumatic machinery and has no reference to compressed air tanks for hydraulic machinery regulations concerning which have not yet been formulated.

The United States Malleable Iron Company will begin operations October 1 in the foundry plant at Vesper, Wood County, Wis., formerly owned by the bankrupt Vesper Malleable Iron Company. The foundry has been idle for more than a year. The new operations will be in charge of J. L. Hooper, of Cleveland, Ohio, while the business and financial end will be taken care of by William J. Sarres, vice-president, and H. B. Mundt, secretary and treasurer.

The growing demand of automobile manufacturers for steel castings made from the electric furnace is indicated by the fact that one of the largest automobile firms in England has recently put in such a furnace to produce its own castings.

The Machinery Markets

Despite recent signs of trade betterment not much improvement has actually been felt in most sections of the country and the summer dullness hangs on, as perhaps might be expected in view of the heat of early September. The New York trade is receiving small and scattered orders and on the whole business is quiet with inquiries slow in appearing. In Philadelphia, also, sales are largely confined to small transactions, so far as machine tools are concerned, although the demand for power plant equipment is fair and more is looked for. New England trade is up to the average, although with the usual effect of summer conditions on both orders and inquiries. Business has been dull with dealers in Cleveland, but single tool inquiry has increased and the railroads are showing greater disposition to go ahead with improvements. With the strikes over, all foundries are now in operation in Cincinnati, the export trade shows signs of greater activity and conditions generally are better, after a heavy falling off in trade in August. The week has been more quiet as to orders in Detroit, but inquiries have kept up and the demand for second-hand machinery is fair. Milwaukee conditions continue to be satisfactory. Industry generally has been active in the Central South and the demand for machinery has been correspondingly good. In Birmingham the demand for machinery and machine tools is better than it was at this time last year and trade on the whole is good. St. Louis is rather quiet, though better than it was when the crops were at their height. Manufacturing is on the increase in Texas and machinery and tools are moving in a satisfactory way. On the Pacific coast the trade is figuring on equipment for the navy repair ship Prometheus, but otherwise inquiry is light and sales are few. Improvement is expected in the coming month of some large construction contract.

New York

NEW YORK, September 10, 1913.

Sales have been few and scattered since the last report and the looked-for betterment in trade, indications of which were felt a few days ago, seems to have been halted. This may be attributed in part to the fact that the first few days of September were as warm and enervating as any of the summer, while the nearness of passage in the United States Senate of the new tariff bill is another influence which makes for at least temporary dullness. Questions as to the probable effect of the proposed new schedule are again frequently heard in the trade. The conclusion of nearly all discussions of the subject is a hope that final action will be delayed no longer than necessary. The activity of machine tool salesmen in getting to any point where there is the slightest chance of selling a single machine of comparatively small valuation is unusually noticeable. Not only are definite inquiries unnecessary to make salesmen lose no time in getting aboard a train, but they do so even where there is a considerable amount of uncertainty as to whether their machines can be used at all by the manufacturers on whom they are to call. In some of these cases sales are made in unexpected places, while in others at least good missionary work is done.

The Union Stove Works, Peekskill, N. Y., is receiving bids for a three-story factory, 30 x 60 ft.

William R. Roberts, Utica, N. Y., will erect and equip a two-story machine shop, 35 x 74 ft., on Henry street.

The C. A. Durr Packing Company, Utica, N. Y., is building a two-story addition, 46 x 52 ft., to its packing plant on Schuyler street.

The city of Schenectady, N. Y., is receiving bids for erecting buildings for a garbage reduction plant and for installation of a Green garbage conveyor. Frederick E. Johnson is secretary of the board of contract and supply.

The Sowers Mfg. Company, 1300 Niagara street, Buffalo, is having plans prepared for a new foundry building at its plant at Niagara street, Auburn avenue and the New York Central Belt Line to take the place of the building recently destroyed by fire.

The Sartorial Mfg. Company, Elmsford, N. Y., is having plans drawn for an addition to be made to its factory.

The New York Central Railroad has let the contract for construction of a pumping station, 30 x 55 ft., one-story at Rome, N. Y.

The village of Port Chester, N. Y., has plans in preparation for a sewage disposal plant, the estimated cost of which is \$100,000.

The Syracuse Chilled Plow Company has let contracts and commenced work on additions and alterations to be made to its plant.

The Empire Wall Plaster Company, Utica, N. Y., will build a manufacturing plant, 50 x 100 ft., on Rossmuth avenue.

The Broadalbin Knitting Company, Broadalbin, N. Y., is building a three-story addition, 60 x 70 ft., to its present plant.

The Rogers Machine Tool Company, recently incorporated with a capital stock of \$50,000, will locate its factory at Belmont, N. Y. D. H., D. B. and F. S. Rogers are the incorporators.

The Anchor Barrel Corporation has been incorporated by E. L. Pierce, H. W. Jordan and E. D. Winkworth, of Syracuse, N. Y., with a capital stock of \$100,000, and will build a manufacturing plant at Solway, a suburb of Syracuse.

The Troy Knitting Mill Company, Troy, N. Y., recently incorporated with a capital stock of \$35,000, has completed plans for a knitting mill which it will build at once.

The Falconer Iron Works, Jamestown, N. Y., has been incorporated by Gardner Gilbert and C. L. Klock to take over the copartnership business heretofore conducted under the same name.

The Village Board, Williamson, N. Y., is having plans prepared for a waterworks system to cost about \$70,000. The water supply will be obtained from Lake Ontario by the construction of a 10-mile pipe line.

The Tonawanda Board & Paper Company, Tonawanda, N. Y., will build a large brick addition to its plant on Goose Island. It will also build a freight unloading trestle of modern construction along Tonawanda Creek for the handling of material to and from canal boats.

The Charles H. Batt Furniture Company, Buffalo, will build a three-story brick addition to its plant on Leslie street and the Erie Railroad.

The Schreiber Brewing Company, Buffalo, is building an addition to its power house at Fillmore avenue and Broadway.

The Harvey Laundry Company, Buffalo, is erecting and equipping a new boiler house at its plant at Chango street and Massachusetts avenue.

The Champion Wagon Company, Oswego, N. Y., has been incorporated with a capital stock of \$25,000 and will soon complete plans for a manufacturing plant.

The State Hospital Commission, Albany, N. Y., will receive bids September 22 for the reconstruction of the electric lighting system, steam and exhaust piping at the Binghamton State Hospital, Binghamton, N. Y.

The McClintic-Marshall Construction Company has received the contract for the steel work, 1500 tons, for the new boiler house, 70 x 250 ft., to be erected by the Solvay Process Company at its plant in Solvay, N. Y., to contain five boilers having a total capacity of 6000 hp. A 250-ft. steel stack will also be erected.

The Randolph Electric Light & Power Company, Randolph, N. Y., is planning to install in its plant this winter a 100 to 150-kw. three-phase 60-cycle 2300-volt generator with engine. J. W. Grace is manager.

The Otis Elevator Company, New York, has let the contract for the foundation of a new elevator car factory and shipping building, 200 x 370 ft., one story, steel and brick construction, which it will erect at Harrison, N. J., from private plans. Equipment will be moved from other buildings and little new machinery will be needed.

New England

BOSTON, MASS., September 9, 1913.

The week of Labor Day marks the climax of the hot weather and vacation season's influence on business, and it is still making itself felt. But while some houses are less busy than they have been others are rushed with orders. The average is good enough. The machinery people report that the summer is showing its usual effect in reducing orders and inquiries. Generally speaking men are hopeful and many of them are confident as to the outlook for the immediate future. The representatives of the steel mills are finding a very good business. Most traveling men who come closely in touch with the metal industry of New England believe the average of the business is better than normal.

The strike at the works of the B. F. Sturtevant Company and the Becker Milling Machine Company, Hyde Park, Mass., has been called off and the men are back at work.

The Bridgeport Chain Company, Bridgeport, Conn., has prepared plans for an additional building 40 x 200 ft., three stories. It will parallel the present main building, to which it will be connected by bridges, and will be given over to a complete galvanizing plant and plating department, general manufacturing and storage. The business has grown so rapidly that large additional capacity has become imperative.

The Bridgeport Brass Company, Bridgeport, Conn., has received bids for estimating purposes, for an additional building, having 60,000 sq. ft. of floor space, four stories, of concrete faced with brick. The structure will be used to house additional manufacturing equipment and will be located on the corner of East Main street and Crescent avenue. However, the company has not yet decided to go ahead with the plans at the present time.

The Francis Reed Company, Worcester, Mass., manufacturer of drilling machines and planer chucks, has taken over the plant of the H. G. Barr Company, and has thereby doubled its own capacity. The Francis Reed Company acquired rights to manufacture the Barr drilling machines by purchase at the recent auction, the exception being the tapping attachment, which went to the C. G. Allen Company, Barre, Mass. The Barr business has been transferred to the Reed shops on Hammond street. No additional equipment will be needed in the immediate future.

The Abbott Ball Company, Hartford, Conn., manufacturer of steel balls for burnishing metal goods by tumbling, and burnishing barrels, will install in its new factory special machinery of its own design, which is being made to order, but will increase its machine shop equipment with a 42-in. boring mill, a 3-ft. or 4-ft. radial drilling machine and a No. 2 or No. 3 plain milling machine. The building will be 50 x 125 ft., one story, of brick, with steel columns and roof beams.

The American Chain Company is occupying and operating its new works at Bridgeport, Conn., and has sent out an announcement to the trade calling attention to the increased capacity and the very modern manufacturing conditions which have been created. The new factory is a concentration of various plants which were taken over by the company about a year ago, the principal ones being located at Sherrill, N. Y., and Cleveland, Ohio. The Bridgeport works, as so far built, consists of a three-story building, 50 x 206 ft., with a one-story wing at one end, 110 x 242 ft., with sawtooth roof, and a galvanizing building, 26 x 100 ft., in the partly inclosed area. Plans call for the construction of a duplicate of the one-story wing, additional detached buildings for heat treating and electroplating, each 26 x 100 ft., storage sheds and a power plant which will be established in the immediate future. The company owns eight acres of land on the main line of the New York, New Haven & Hartford Railroad, from which a spur track runs to a long loading platform.

The Elliott Addressing Machine Company, Cambridge, Mass., will erect an addition to its factory 40 x 180 ft., two stories, of brick.

The Winchester Repeating Arms Company, New Haven, Conn., has taken out a permit for the erection of a building 52 x 112 ft., to replace the present drop forge shop of the gun shop. The structure will be almost entirely of glass which will be set in steel frames.

The Worcester Metal Goods Company, 17 Hermon street, Worcester, Mass., has sold its business to the Robert N. Bassett Company, Derby, Conn., which it is stated will continue to operate the Worcester factory. Edwin Brown, Worcester, retires from the management, Daniel W. Northrup of Derby succeeding him as president and manager.

Foster, Merriam & Co., Meriden, Conn., are planning a large addition which will double the capacity of their iron foundry.

The State Harbor Improvement Commission Rhode Island is advertising for bids for a pier, bids close September 25. The pier will be 400 ft. long and 110 ft. wide, two stories for 200 ft. and one story for the remainder. The materials used will be steel and concrete. Cargo hoists and other freight handling equipment will be installed.

The Hartford Builders' Finish Company, Hartford, Conn., will erect an additional brick factory 40 x 100 ft. two stories.

Additions to general manufacturing facilities of New England include the following: Koonz Mfg. Company, Greenfield, Mass., occupying factory for the manufacture of jewelry; Renfrew Mfg. Company, Adams, Mass., mill buildings respectively 175 x 200 ft., two stories, and 70 x 140 ft., one story, the latter with foundations designed to support a second story; American Cask Company, Springfield, Mass., plant at East Springfield consisting of three buildings, the main structure to be 45 x 200 ft., of concrete.

Philadelphia

PHILADELPHIA, PA., September 8, 1913.

The opening week in September was generally quiet. The holiday interrupted business to a considerable extent and few of the important negotiations under way received more than passing attention. Sales were almost entirely confined to small transactions. Few new inquiries of any kind came out. Railroad buying continues at a low ebb. A fair volume of business in power-plant equipment has been coming out; while the bulk of the current business is in small capacity equipment, several large installations, particularly in connection with the development of electric power, are in sight. The second-hand machinery market has been dull. New business in iron and steel castings has been lighter, and some of the steel casting plants are operating irregularly, averaging approximately 50 to 75 per cent. of capacity.

George W. Hosfeld, manufacturer of signs, 1235 Vine street, has been receiving bids for the erection of a three-story brick factory building, 40 x 100 ft., at Ninth street and Rising Sun lane.

The report that the Stephen Greene Company printer, Sixteenth and Arch streets, will erect a 19-story building, to be used as a printing plant, and also a large power plant in connection with it, is denied by officials of the company.

Considerable interest is being taken in the Naval Shore Board's report on the Philadelphia Navy Yard. The recommendation of the board to the Navy Department that this yard be used for advanced base work is taken to indicate a material increase in the facilities of the yard, which will mean the ultimate purchase of a large amount of equipment of various kinds. It is proposed to largely increase the foundry facilities of the yard.

The Schuylkill Forging & Steel Company, American and Pike streets, has let a contract for a 35-ft. addition to its main shop for the purpose of housing a 3500-lb. steam hammer which is being installed. A little later on the company will consider the purchase of additional equipment.

Ballinger & Perrot, engineers, have preliminary plans in preparation for an additional six-story manufacturing building, 80 x 200 ft., for the Victor Talking Machine Company, Camden, N. J.

Charles W. Denny, engineer, is preparing plans for the rebuilding of the plant of the Union Petroleum Company, recently destroyed by fire. A group of six buildings, of brick and concrete, is contemplated.

Plans have been filed for the erection of a three-story cold storage warehouse, 87 x 145 ft., to be erected by A. Raymond Raff, for Swift & Co., at Thirty-first and Market streets.

John T. Windrim, architect and engineer, is reported to have plans under way for a large power station for the Philadelphia Electric Company, to be erected on a site recently acquired at Beach and Palmer streets, where the abandoned plant of the Nease & Levy Shipbuilding Company is located. The site is on the Delaware River front, and it is said that the Philadelphia Electric Company is planning to build on it one of its largest stations.

Justice Cox, Jr., & Co., Land Title Building, Philadelphia, Pa., are in the market for a 40 to 50 ton shifting locomotive for Southern delivery.

The incorporation of the Bridgeport Foundry & Machine Company, Bridgeport, Pa., with a capital of \$100,000, is announced. The company will make iron and brass castings and manufacture and repair machinery. The incorporators are Benjamin F. Evans, J. McGuirk and J. C. Laird, all of Norristown, Pa.

Plans and specifications for a municipal pumping station for the city of Lancaster, Pa., are being prepared by F. H. Shaw, engineer, of that city.

Plans are being prepared, it is stated, by the borough engineer of Huntingdon, Pa., for a large filtration plant for the Huntingdon Water & Filtration Company. Specifications are expected to be ready for estimate at an early date.

The Eastern Pennsylvania Power Company, Easton, Pa., is making additions to its power plant on Dock street. Details are not yet available.

The Hookless Fastener Company, incorporated with \$100,000 capital stock to succeed the Automatic Hook & Eye Company, of Hoboken, N. J., is removing its plant to Meadville, Pa., having leased a building on Race street, 40 x 70 ft. The company will have its own machine shop for the manufacture of machinery in addition to its factory for the making of the fastener. J. Lewis Walker is president; C. A. Lamb, of Erie, vice-president; W. S. McGunagle, Meadville, secretary-treasurer; Gustave Sundebeck, Hoboken, N. J., mechanical superintendent.

Cleveland

CLEVELAND, OHIO., September 9, 1913.

Although business with dealers has been dull, the volume of inquiries shows considerable improvement. New inquiry, however, is practically all for single tools. The demand for second-hand machinery is not active. Railroads in this territory are showing more of a disposition to go ahead with improvements, and this change of policy is noticed in the few small railroad lists of machine tools that have been sent out recently. Orders of rolling mill equipment report considerable new inquiries. Sheet metal working machinery is in good demand. Conditions in the local foundry trade continue quite satisfactory.

The Pennsylvania Lines, through H. O. Hukill, purchasing agent, Pittsburgh, Pa., is receiving bids for the following machinery equipment for its freight car repair shops at Indiana Harbor, Ind.:

- One 2-in. forging and heading machine.
- One double punch and shear.
- Two triple head 2-in. bolt threading machines.
- One 500-lb. power hammer, belt driven.
- One 200-lb. hammer, motor driven.
- Two 48-in. carwheel boring mills, motor driven.
- One 400-ton 48-in. carwheel press, motor driven.
- One grind stone, belt driven.
- One 22-in. upright drill, belt driven.
- One heavy pattern radial drill, motor driven.
- One double end tool grinder, belt driven.
- One 16-in., 4-ft. center screw cutting engine lathe.
- One double head axle lathe, motor driven.
- One 48-in. carwheel lathe, motor driven.

The General Electric Company has had plans prepared for the seventh unit of its group of factory buildings for the National Quality lamp division which is being erected on 152d street, Cleveland. The building will be 60 x 240 ft., three stories, of brick and concrete construction. It will be used in the manufacture of glass globes.

The Langner Machine Company, Cleveland, has been incorporated with \$200,000 capital stock by C. J. Schert, C. B. Mehard, C. D. Scully, P. M. Sloan and C. J. Sanders, all of Pittsburgh, Pa.

The Individual Garbage Consumer Co., a Pennsylvania corporation, with a capitalization of \$150,000, has secured options on sites with a view of erecting a plant in Cleveland for the manufacture of a patented garbage consumer invented by Albert J. Roberts, who, with A. A. Leonard, Schofield Building, Cleveland, and others, is interested in the company.

The Ashtabula Mfg. Company, Ashtabula, Ohio., has been incorporated with a capitalization of \$35,000 by David Lamb, M. J. Gottshalk, W. M. Dudley and others to manufacture hardware.

The Chester Rubber Tire & Tool Company, Chester, Ohio, has been organized to establish a plant for the manufacture of automobile tires and tubes. John E. Newell is president of the company.

The Troike Muffler & Mfg. Company, Lorain, Ohio, has completed a new plant on Washington avenue, in that city, for the manufacture of gasoline engine exhaust mufflers. The company occupies a building 42 x 125 ft.

The Weidig Foundry Company, Zanesville, Ohio, will shortly begin the erection of its new plant, which will be 80 x 116 ft.

The Alliance Clay Products Company, Alliance, Ohio, will erect a new brick manufacturing plant which will cost about \$100,000.

The Bock Bearing Company, Toledo, Ohio, has been organized by W. E. Bock, A. M. Donovan and others. The company has secured a site at Phillips avenue and the Michigan Central Railroad, on which it will erect a one-story fireproof building, 62 x 225 ft. The company will make bearings and a worm screw drive for automobiles. W. E. Bock is president.

The plant of the Standard Chain Company, Mansfield, Ohio, was seriously damaged by fire a few days ago. The burned portion will be rebuilt at once and some improvements will be made to increase the capacity of the plant.

A new rubber plant will be established in Bowling Green, Ohio, by the Bowling Green Rubber Company, which has been organized with a capital stock of \$25,000. The company will make rubber tire accessories and various rubber specialties.

A new plant will be established in Oberlin, Ohio, by the New York Distributing Company for the manufacture of bottles. As a bonus the people of the city will provide a seven-acre site and erect a factory building.

Cincinnati

CINCINNATI, OHIO, September 8, 1913.

All of the foundries in Cincinnati are now in operation. Several refused to accede to the demands of the molders' union and are only employing non-union help. The failure of the teamsters' strike has also been a factor in clearing up local labor troubles. It is reported from authoritative sources that new business during August with the majority of local machine tool builders was fully 50 per cent. below that of any previous month of this year. However, present indications point to an improvement this fall, as the export trade shows signs of awakening. Second-hand machinery dealers state that business with them is yet far below normal. Boiler and tank makers are fairly busy.

The proposed plant of the Gedge-Gray Company, machinery manufacturer, will be 68 x 160 ft., one story and of brick construction. The company has acquired a site at Lockland, Ohio, a Cincinnati suburb. Its present address is Hamilton, Ohio.

The National Pretzel Company, Cincinnati, is erecting a three-story brick building that will be 25 x 150 ft., and for which some equipment will be required.

The American Laundry Machinery Company, Norwood, Ohio, a Cincinnati suburb, has let contract for an extensive addition to its factory. Nothing is known as to machinery requirements.

The John W. Brown Mfg. Company, Columbus, Ohio, is buying machinery to be installed in its new factory, now under construction, mention of which was made several months ago.

The Norfolk & Western Railroad Company is increasing its terminal facilities at Columbus, Ohio. Among the improvements under way is a large locomotive roundhouse.

The Buckeye Window Glass Company's plant at Columbus, Ohio, was partially destroyed by fire September 3. The power plant was badly damaged, and much valuable machinery ruined. Rebuilding plans are already under way.

The Excelsior Shoe Company, Portsmouth, Ohio, has commissioned F. H. Smith, Dayton, Ohio, to draw up plans for a power house, for which some power plant equipment will be needed.

The West Side Lumber Company, Hamilton, Ohio, is fitting up its new woodworking plant, mention of which was made some time ago.

The Storer Bros. Company, Ada, Ohio, has been incorporated with \$65,000 capital stock to erect an ice plant. C. B. Storer is one of the principal incorporators.

The Banfield Clay Company, Irondale, Ohio, has been incorporated to erect a large brick making plant. William Banfield may be addressed for particulars as to machinery equipment required.

The Butcher Bailing Machine Company, Mt. Vernon, Ohio, is fitting up a plant for the manufacture of oil well specialties. Warren Butcher is vice-president and general manager of the new company.

The Niles Tool Works Company, Hamilton, Ohio, is remodeling its former tool shop, a building 55 x 160 ft., which will be used for manufacturing purposes.

Ironton, Ohio, has decided upon the reconstruction of the municipal water system, involving an ex-

penditure of \$174,000. An intake tower, pumping station and filter plant will be built, in addition to mains.

The Crystal Ice & Cold Storage Company, Ashland, Ky., has had plans prepared for a three-story addition to its plant, for which refrigerating and power equipment will be required.

Detroit

DETROIT, MICH., September 8, 1913.

The local machine tool market has been more quiet the past week as to orders, but inquiries have held up very well. Transactions have been confined rather closely to single tools, propositions of larger magnitude having a tendency to close slowly. Considerable business has been transacted in second-hand machinery, both through the regular channels and by the sale of the equipment of a number of concerns which have been in financial difficulties. A better business is reported in engines and boilers, especially the latter. Builders are figuring on a large amount of new work. Local manufacturers will hold a "Made in Detroit" exposition this week, merchants on all of the principal thoroughfares having donated the use of their show windows for the display of the city's manufactures. Every prominent manufacturer in the city will exhibit its products.

The Swedish Crucible Steel Company, Detroit, through R. E. Raseman, architect, has awarded contracts for a large addition to its foundry building.

The affairs of the Krit Motor Car Company, Detroit, have been placed in the hands of creditors and the Union Trust Company and an arrangement effected whereby an extension of about two years is given the company in which to liquidate its indebtedness. Four representatives of the creditors and Charles R. Dunn, vice-president of the Trust Company, have been placed on the board of directors to insure the working out of the plan.

The Towar Wayne County Creamery Company, Detroit, is having plans prepared for a new plant. It will be approximately 100 x 200 ft., five stories, of steel and cement construction. New equipment for the handling of milk will be installed throughout and the plant and machinery will represent an investment of \$500,000.

Berry Bros., Detroit, varnish manufacturers, have begun the construction of an addition to its branch plant at Walkerville to cost about \$75,000.

The Stocker Mfg. Company, Detroit, has been incorporated to manufacture a double-action automobile pump patented by Robert Galen, secretary of the company. A factory has been obtained at 61 Fort street, east.

The J. E. Boles Iron & Wire Works, Detroit, has been incorporated with \$100,000 capital stock to take over the unincorporated business of the same style conducted by J. E. Bolles, who is the principal stockholder of the new company. It is stated that no changes will be made at present.

William Heap & Sons, Grand Haven, Mich., have taken over the plant of the Cookerette Company in that city and will remodel it and equip it for use as a brass foundry.

The Mount Clemens Mfg. Company, Mount Clemens, Mich., has been incorporated with \$50,000 capital stock to manufacture an improved type of threshing machine and other agricultural machinery. William Sawm is the principal stockholder.

The Advance Mfg. Company, Hastings, Mich., manufacturer of vacuum cleaners, has outgrown its present quarters and will remove its plant to Kalamazoo, Mich., where a larger factory has been secured.

The H. M. Hallett Company, Ludington, Mich., has been organized with a capital stock of \$1,000,000 to take over the business of H. M. Hallett, manufacturer of polishes. The city of Ludington has donated a site for a new factory, and over \$100,000 will be expended on new buildings and equipment.

The plant of the Cutting Motor Car Company, Jackson, Mich., was sold at receiver's sale to William M. Thompson, president of the Jackson City Bank. It is rumored that Mr. Thompson will organize a new company and continue the operation of the plant.

The Magic Wall Paper Remover Company, Grand Rapids, Mich., has been incorporated with \$24,000 capital stock to manufacture wall-cleaning compounds. M. H. Carmody is among those interested.

The Michigan Cabinet Company, Grand Rapids, Mich., will build an addition to its factory costing \$4000.

The Clio Condensed Milk Company, Clio, Mich., has been incorporated with \$50,000 capital stock. It is erecting a concrete factory and will equip it with modern machinery for the manufacture of condensed and malted milk.

Chicago

CHICAGO, ILL., September 8, 1913.

John M. Haskins has finished plans for a two-story brass foundry and factory 50 x 134 ft., to be erected by John Kelly at Forty-fifth court and Congress street, Chicago. The total cost will be \$15,000.

Charles A. Chapman, 28 East Jackson boulevard, Chicago, is preparing plans for a two-story lighting plant to be erected for the city of Elgin, Ill., to cost \$150,000.

The Commonwealth Edison Company, Chicago, has purchased the vacant premises at the northeast corner of Cottage Grove avenue and Sixty-third street, and is believed a power station will be erected on the property.

Montgomery Ward & Co., Chicago, have been issued a permit for a three-story factory at 928 Hawthorne avenue to cost \$20,000.

Becker Bros., 561 Washington street, Chicago, and the engineers for a three-story brick factory 42 x 110 ft. to be built at 23 North Jefferson street by the Mann & Thielberg Company at a cost of \$35,000.

The Stannard Power Equipment Company, 53 West Jackson boulevard, Chicago, has been incorporated to deal in and install power equipment. James M. Stannard, George W. Clucas and Howard W. Baker are the incorporators.

The Dann Oil Cushion Spring Insert Company, 12 North Dearborn street, Chicago, has been organized with a capital stock of \$60,000 by Frederic De Young, Harry C. O'Brien and Albert H. Roseler, and will manufacture steel, iron and metal specialties.

The Western Type Foundry Company has purchased the property of the Wiebkind-Hardinge Company, tool manufacturer, at 1131 Newport avenue, Chicago, and has increased its capital stock from \$25,000 to \$150,000.

The Chicago Stove & Range Company, Chicago, has enlarged its capital stock from \$25,000 to \$105,000.

The Ira B. Cook estate will build a two-story factory at 2335 West Van Buren street, Chicago, to cost \$25,000.

J. W. Sawn, 5703 Indiana avenue, Chicago, is planning the erection of a two-story brick factory at 206 Harrison street to cost \$25,000.

The J. T. H. Company, Chicago Heights, Ill., has been incorporated with \$5000 capital stock to manufacture electrical and other appliances. The incorporators are Joseph Sekavec, Hugh Kennedy and John T. Hummel.

Correcting an item in last week's issue of *The Iron Age*, the Parrett Tractor Company, with a factory and principal office at Ottawa, Ill., has been incorporated with \$50,000 capital stock and will manufacture light tractors. Dent Parrett is president and general manager; Henry Parrett, vice-president; Thurlow G. Edgington, secretary; and Edward G. Zilm, treasurer.

The Universal Wrench & Tool Company, Sterling, Ill., has been incorporated with \$50,000 capital stock to manufacture wrenches and to do a general machinery business. Robert McGosh, John C. Haglock and William F. Stedman are the incorporators.

The Aurora Automatic Machinery Company, Aurora, Ill., expects to install additional machinery in its plant for the manufacture of automatic tools.

Anita, Iowa, has voted \$15,000 bonds for waterworks. A bond issue of \$14,000 has been voted for an extension of the city waterworks at Belmond, Iowa.

The Blanchard Aerial Works of America, 615 Bell Building, Omaha, Neb., has been incorporated with a capital stock of \$25,000 to engage in the manufacture of monoplanes. J. F. Blanchard of Loup City is president. C. H. Kiker is vice-president and manager, J. J. Jones, treasurer and K. G. Regnar, of Sargent, secretary. The company intends to locate a plant in Omaha.

The Kemper-Odee Gas Engine Company, Albert Lea, Minn., is preparing plans for replacing its factory with a fireproof concrete, brick and steel construction building 60 x 100 ft. Bids will be received in the near future. The new plant will be equipped with machinery for the manufacture of engines.

A bond issue of \$26,000 has been approved and contract will be let for the installation of a complete waterworks system at Carrington, N. D.

The Road Supply & Metal Company, with headquarters in Topeka, Kan., will establish a factory in Hutchinson, Kan., for the manufacture of culverts, covered arches, well tubing, etc.

A site has been purchased by the Thomas Railway Track Appliance Company, Kansas City, Kan., on which a plant costing \$37,000 is to be erected.

Milwaukee

MILWAUKEE, WIS., September 8, 1913.

More signs of encouragement are seen in the machinery trade in this district. Unusually good inquiries have appeared for prime movers and other heavy machinery, and some good business is in immediate prospect. The tool builders are continuing their rather extraordinary runs and are again falling behind on deliveries. During the summer they were able to catch up to some extent. One milling machine interest was nearly six months behind on its deliveries on June 1, and today has been able to cut this down only four or six weeks. The situation in general has clarified to a slight extent, but the waiting attitude is still persistent.

An involuntary petition in bankruptcy has been filed against the Keelyn Electric Company of Milwaukee. William Peterman has been appointed receiver. The company builds electric motors and is a general electrical contractor.

The Siebers & Raasch Pattern Works, 686-690 National avenue, Milwaukee, has established a branch works at Waukesha, Wis., locating in the Bullard shops 517-519 Main street. Waukesha has for some time needed greater pattern-making facilities. Mr. Raasch will manage the Waukesha branch.

The North End Foundry Company, Milwaukee, is completing its new plant at Sixtieth avenue and Burnham street, West Allis, and expects to begin operations before October 1.

The Steam Appliance Company is erecting a new factory building at Sixty-third avenue and Burnham street, West Allis, and will employ 50 men in the manufacture of gauges, valves and other steam engine and boiler accessories. The company was organized several months ago and at present is operating on a small scale leased quarters.

The Lakeside Bridge & Steel Company, Milwaukee, has awarded a contract for steel tainter gates and appurtenances for the water power of the Wisconsin River Power Company at Prairie du Sac, Wis. The contract is for about 400 tons of structural shapes, valves, etc.

The Merrill Iron Works, Merrill Wis., has recently booked so many orders for castings and machinery for paper and lumber mills that it is working overtime and using all available molders and machinists. The company has contracted for the delivery of about 40 carloads of castings before January 1. In addition to operating a foundry and machine shop the company is producing and marketing two specialties, a safety set screw and a grinder. Several extensions were made to complete the past summer.

The new firm organized by Frank A. Tuschen of Milwaukee and Andrew S. Scheuerell of Sun Prairie to take over the works of the defunct Yale Mfg. Company at Oostburg, Sheboygan County, Wis., plans to add facilities for the production of a general line of steel stampings and castings. The present works are designed for producing automobile mufflers and valves. Some new equipment is now being purchased. The proposed extensions will probably not be made until early next year.

The Poyssippi Light & Power Company has been organized at Poyssippi, Wis., with a capital stock of \$5000 to erect and operate an electric light and power plant. The promoters are Lyman Chester and F. E. Colt.

The West Bend Aluminum Company, West Bend, manufacturer of aluminum utensils and stampings, is planning to replace its present frame shop with brick buildings early in 1914. A large equipment of presses with individual electric drive will be required. Carl Wendorf is superintendent.

Charles Heon has organized the Heon Electric Recorder Company with a capital stock of \$15,000 to establish a plant in Janesville, Wis., for the manufacture of an electric time-recording and alarm device for homes, garages, factories and similar purposes. A shop will be erected as soon as a suitable site is secured.

W. H. Robinson, formerly secretary of the Racine-Sattley Company, which abandoned its large works at Racine, Wis., two years ago and concentrated its operations at Springfield, Ill., is reported to be organizing a new company to manufacture springs, spring vehicles and automobile parts. It is planned to take over the Racine-Sattley plant, part of which is under lease to several concerns, including the Lavigne Gear Company, Wisconsin Electrical Mfg. Company and others.

The Sterling Wheelbarrow Company, West Allis, manufacturer of steel wheelbarrows and steel wheels, is making a large addition to its works at Sixty-fourth and Allen avenues. The capacity will be more than doubled.

It is reported on good authority that the Hamilton-Beach Mfg. Company of Racine will leave that city and locate elsewhere. The company was purchased by Eastern interests a year ago. Messrs. Hamilton and Beach have since organized a company similar to the original one. Both manufacture electrical specialties and appliances.

Wheeling

WHEELING, W. VA., September 8, 1913.

The Electric Undercurrent Company is building a plant at Lamberton, W. Va., consisting of two brick buildings, each 50 x 120 ft. The work is in charge of David Bibighaus. H. L. Lambert is president of the company and patentee of the street railway undercurrent system which the company will manufacture.

The Potomac Pottery Company, Keyser, W. Va., has been incorporated with \$25,000 capital stock by F. C. S. Byford, of Keyser, W. Va.; John A. Miller, Elizabeth Miller, George R. Cox, Jessie Cox, all of Perth Amboy, N. J.

Robert and Charles Barrickman will move their brick plant to a new location in Star City, W. Va., and will enlarge the plant and equip it with new machinery.

A brick plant 118 x 215 ft., four stories, is being built at Irondale, Ohio, by the Ohio Sewer & Pipe Line Company, of which William Banfield, of Follansbee, W. Va., is president.

The Acme Construction Company, Williamson, W. Va., has been incorporated with \$10,000 capital stock by E. H. Lambert, W. B. Elswick, Isom Blackburn, M. J. Riblett, Alex Bishop, of Williamson, W. Va.

The Mount Hope Electric Power & Water Company, Mount Hope, W. Va., was recently incorporated with \$25,000 capital stock to erect a lighting and waterworks plant. John Faulkner is one of the principal incorporators.

The Pocahontas Consolidated Collieries Company, of which I. T. Mann, of Bramwell, W. Va., is president, is about to let the contract for the construction of a steel tippie at Lick Branch, 17 miles west of Bluefield, on the main line of the Norfolk & Western Railway. The tippie, which is to have a capacity of 3000 tons in 10 hours, is to replace a wooden one that has outlived its usefulness. It is intended to handle the product of the Lick Branch and the Shamokin collieries. The cost will be around \$65,000. The tippie is to be completed by April 1, 1914.

A roller flour mill will be built at Graham, Va., with an initial capacity of 100 barrels daily. Capt. G. M. Barger is one of the chief promoters.

Indianapolis

INDIANAPOLIS, IND., September 8, 1913.

Included in the construction plans of the Stenotype Company, Indianapolis, Ind., notice of which was made in last week's issue of *The Iron Age*, is a power house 45 x 130 ft., which will contain two 250-hp. boilers. The company will generate its own power for operating its machinery, which, as before stated, will be motor driven.

The Merchants Heat & Light Company, Indianapolis, has increased its capital stock \$250,000 and authorized an issue of \$325,000 in bonds. The company recently took over the People's Light & Heat Company of this city.

The Indianapolis Aerial Navigation Company has been incorporated with \$100,000 capital stock to manufacture aerial machines. The directors are G. L. Bum-baugh, H. B. Wilson and H. Luckey.

The Interurban Construction Company, Indianapolis, has been incorporated with \$25,000 capital stock to construct railroads, bridges, etc. The directors are Gilmer Bray, Charles Parker and William C. Thompson.

The Capital City Body Company, Indianapolis, manufacturer of automobile bodies, has increased its capital stock from \$10,000 to \$30,000.

The Queen Grader & Cleaner Company of this city has increased its capital stock \$140,000.

The Delta Electric Company, Marion, Ind., has been incorporated with \$25,000 capital stock to manufacture electrical goods. The directors are Theodore K. Allen, Milton J. Smith and Clarence R. LaBier.

The Acme Mfg. Company, South Bend, Ind., has been incorporated with \$25,000 capital stock to manufacture furniture. The directors are E. E. Burner, O. A. Burner and O. E. Julien.

The automobile body department of the Studebaker

Corporation has been transferred from Pontiac, Mich., to South Bend, Ind.

The Delaware Brass & Aluminum Company, recently organized at Muncie, Ind., has begun the erection of brick factory buildings. John Beckett is president; Charles Beckett, secretary-treasurer, and P. J. Casey, Charles Bowers and R. George Simmonds, directors.

Elbert W. Shirk, general manager of the Indiana Mfg. Company, Peru, Ind., has been appointed receiver of the company, which manufactures refrigerators and sewing machines and at times has employed 600 people. The company suffered a loss of \$160,000 in the March floods which crippled its credit.

The Automatic Photo Machine Company, South Bend, Ind., has been incorporated with \$5000 capital stock to manufacture photograph machines. The directors are H. M. McIntire, R. W. Jaeger and C. M. Boyce.

The Atlas Foundry Company, Twenty-eighth and Branson streets, Marion, Ind., is erecting a brick addition 60 x 80 ft. for a core, carpenter, pattern and storage department. The building which the new construction will displace is to be utilized as a foundry. A new office of brick, 20 x 32 ft., will also be erected.

The Anderson Die & Model Company, Anderson, Ind., has been organized by H. L. Hedrick, L. E. Poole and I. Miley to manufacture and sell dies and tools.

The Singer Mfg. Company, South Bend, Ind., has started work on its new power station 135 x 165 ft. to be of brick construction and costing \$50,000. On completion of the new plant the old one will be razed and an addition to the factory built on the site. The new plant will be equipped with modern machinery.

The Elwood Box Company, Elwood, Ind., will rebuild its plant recently destroyed by fire that entailed an estimated loss of \$50,000, partly covered by insurance.

The Central South

LOUISVILLE, KY., September 8, 1913.

The trade situation remains generally satisfactory, the gradual improvement in conditions affecting all interests having had a visible result on the demand for machinery. Manufacturers in all lines in this territory appear to be more cheerful as to the future, and are prepared to go ahead with plans for improvements and betterments. In spite of the apparent lateness of the building season, a good many large projects of this nature are being brought out, attracting the attention of manufacturers of heating equipment, elevators, etc. Municipal power plants and water systems are also being enlarged in number, and as special machinery is holding its own there is little cause for complaint.

A permit has been granted for the reconstruction of the Laushberg & Macke factory for the making of church furniture at 970-980 Underhill street, Louisville.

The General Construction Company, Louisville, has the contract for a large apartment house for the Realty Investment Company. Heating plant, elevators and other equipment will be needed. The structure will be six stories and will cost \$200,000.

The National Power Company, organized in Birmingham, Ala., but planning operations in Louisville, is considering the establishment of a factory costing \$500,000 for manufacturing a water motor. S. F. Crecelius is the company's Louisville engineer.

The power plant of the Central Insane Asylum at Lakeland, a Louisville suburb, was destroyed by fire September 4 with \$12,000 loss. The state board of control of charitable institutions has its offices at Frankfort, Ky. W. E. Gardner is superintendent.

Owen L. Carr, Rushville, Ind., will probably erect an electric light plant in Jeffersonville, Ind., a Louisville suburb, arrangements having been made by Mr. Carr to operate a street lighting system in Jeffersonville.

Cary H. Rawls, Cerulean, Ky., is reported to be considering the establishment of an ice factory.

The Princeton Boiler & Engine Works, Princeton, Ky., has been established by Frank Hughes, who is equipping it for the purpose of handling power plant repairs of all kinds.

Harrodsburg, Ky., has decided to enlarge its electric light plant. A committee of the City Council is now getting details preliminary to recommending an appropriation for the purchase of new machinery.

The canning factory of C. F. Saunders and V. O. Gilbert, Frankfort, Ky., was burned recently. Plans for rebuilding have not been decided.

The Campbellsville Water & Light Company, being organized at Campbellsville, Ky., to equip waterworks and an electric light plant.

L. D. Baer, Owensboro, Ky., is planning the construction of a large garage and automobile repair shop. The building will be 85 x 90 ft. Work will begin in the near future.

Charles L. Philippy and Joseph Hawkins, Hickman, Ky., are planning the erection of a cotton gin. Philippy. Power machinery and other equipment will be needed.

D. N. Young, A. Dietz and others, Mt. Sterling, Ky., are organizing a company for the purpose of establishing an ice factory with a daily capacity of tons. The estimated cost of the plant is \$25,000.

Louis Boatwright, Paducah, Ky., has patented an oil burner for domestic use, and plans the establishment of a small factory for manufacturing the device.

Lebanon, Ky., is considering the establishment of municipal electric light and telephone plant. A bond issue of \$50,000 has been proposed.

M. R. James, Charleston, W. Va., is planning to build a power plant at Pineville, Ky., for the purpose of serving coal mines within a radius of 20 miles. Temporary headquarters have been established at Middlesboro, Ky.

Capt. T. S. Shaw, Cadiz, Ky., plans to erect a pair shop for handling work in metal and wood.

A cold storage plant will be erected by Bros. Bros., Elizabethtown, Ky. The contract for the building has been let, and the machinery will be purchased in the near future.

The automobile repair shop of Prather Bros., Georgetown, Ky., operated in connection with the garage, was burned recently with \$3000 loss. The garage and shop will be rebuilt.

The Carlisle Light & Power Company, Carlisle, Ky., has decided on the erection of a 10-ton ice factory to be operated in connection with the power plant.

The Franklin Ice & Cold Storage Company, Franklin, Tenn., has been organized with the election of John Moran as president and John H. Denton as secretary and general manager. The company has \$200,000 capital stock and will build an ice factory and cold storage plant.

The Purina Mill Company, St. Louis, which has purchased the plant of the Just Mill & Feed Company, Knoxville, Tenn., will probably enlarge its facilities.

Columbia, Tenn., is planning the issue of \$100,000 bonds for the purpose of buying and improving privately owned water system.

Maryville, Tenn., is considering a waterworks system. Details may be had from Mayor Everett.

The Dayton Hosiery Mills, Dayton, Tenn., will be in the market for power and special equipment shortly having let a contract for the construction of building.

R. C. Aycock has purchased a hosiery mill at South Pittsburg, Tenn., which he recently sold, and will add to its capacity by the erection of a dyehouse and other improvements. A branch mill will also be established near South Pittsburg.

J. M. Norris & Sons, Harriman, Tenn., will be in the market for woodworking equipment for the manufacture of shuttles and bobbins. A contract for the factory which the concern will occupy has been let.

The Atlas Machine Company, Nashville, Tenn., reports the sale of an engine, generator and other equipment for a street lighting system to the town of Rileysville, Tenn.

The Riverside Mills, Nashville, Tenn., has been incorporated with \$5000 capital stock for the purpose of operating a flour mill. T. I. Ward and C. M. Ward are among the stockholders.

The Holston Mfg. Company, Lenoir, Tenn., will establish a hosiery knitting mill at Morristown, Tenn. at a cost of \$50,000.

The Southern Aseptic Cotton Company, Columbia, S. C., will rebuild its absorbent cotton plant recently burned at a loss of \$50,000.

The Liberty Holding Company, Sumter, S. C., has been incorporated with a capital stock of \$100,000, and will establish a light and power plant.

The Tellico Lumber Company, Tellico Plains, Tenn., will rebuild a sawmill, planing mills and dry kilns recently burned with a loss of \$150,000.

The Tennessee Utilities Company, Tullahoma, Tenn., has plans for a 25,000-hp. hydroelectric plant on Elk River. It will be ready for bids about Nov. 1. G. M. Whitson is president.

Elkin, N. C., has voted \$30,000 bonds for the construction of waterworks and of a sewer system. C. C. Armfield is mayor.

St. Louis

St. Louis, Mo., September 8, 1913.

The machinery market has been rather quiet, though somewhat improved over the conditions prevailing at the crest of the wave of pessimism over the crop conditions in parts of the West and Southwest. It is coming to be realized that the aggregate return from the crops in a financial way will not be so far from past figures as to cause any serious crippling of the damaged spots, while the great proportion of the agricultural area will produce handsomely. Altogether the belief is that the fall business will soon begin to show up well. Collections are reported good.

The American Sirup & Preserving Company, Nashville, Tenn., has begun the construction of its St. Louis branch factory and is taking up the selection of the equipment to be installed.

Fire caused about \$5000 damage to the plant of the St. Louis Dressed Beef Company's packing plant on September 4. The equipment destroyed will be replaced.

The Central Pinch Bar Company, St. Louis, has been incorporated to manufacture pinch bars, etc., by John J. and Louis Sabo, Tony Christ and Alex Taylor.

The Jiffy Water Heater Company, St. Louis, has been incorporated with a capital stock of \$15,000 by Gustave A. Becker, Belleville, Ill., and Aloys A. and Joseph G. Beckmann to manufacture patented water-heating devices and machinery.

The Perfection Blower Company, St. Louis, has been incorporated with \$16,250 capital stock by Christian Neumann, Emil Schray, Henry J. Saller and others to manufacture blowers, fans and other apparatus.

The Elsberry Drainage District, organized to drain 20,000 acres of land in Lincoln and Pike counties, with headquarters at Elsberry, Mo., will require equipment for its pumping station to cost about \$100,000. The ditching contract has been let to the Callahan Construction Company of Kansas City, Mo., at \$180,000.

The National Terra Cotta Company, Kansas City, Mo., has been incorporated with a capital stock of \$50,000 by Harry Stiver, A. F. Brocker and E. M. Brocker and will equip for the manufacture of terra cotta.

The Missouri River Sand & Gravel Company, Boonville, Cooper County, Mo., will utilize \$40,000 of its \$100,000 capital in a plant and equipment at that point.

Graves & Stamp, Des Arc, Mo., will rebuild at once the handle factory which was burned recently with a loss on equipment and building of \$50,000.

The manager of the Missouri Colony for the Feeble Minded and Epileptic at Marshall, Mo., will install at once heating, plumbing, power and ventilating equipment in accordance with plans prepared by J. H. Felt & Co., Kansas City, Mo.

Announcement is made of plans for the equipment of about 20 cheese factories at different points in Missouri by J. L. Kraft & Bros. of Chicago. About \$100,000 will be invested in equipment.

Armour & Co. of Chicago, Ill., will install a plant for handling sheepskins and wool at Kansas City, Mo., requiring about \$100,000 of equipment.

An electric light franchise has been granted by the city of Ava, Mo., to J. W. Pettit, who will construct a plant soon.

The city of Carthage, Mo., through its board of public works, contemplates the purchase of boiler-room coal-weighing apparatus, stokers, etc.

The electric light plant at Dexter, Mo., owned by B. F. Eicholtz is to be improved by the installation of a 125-kw. generator and allied equipment.

The Kansas City Terminal Company, Kansas City, Mo., will equip a power house to furnish light, heat, power, etc., including compressed air, to the new terminals and station. John V. Hanna is chief engineer.

A franchise for an electric light plant at Purcell, Mo., has been awarded to A. M. Baird of Cartersville, Mo., who will proceed with the construction at once.

An electric light plant is contemplated by the city of Russellville, Mo., the mayor having the matter in charge.

The Wellington Light & Power Company, Wellington, Mo., has been incorporated with a capital stock of \$16,000 by W. J. C. Westermann, W. H. Breuer and H. H. Neese and will equip a public service plant.

William Higgins of Louisville, Ky., will equip a concentrating plant on property acquired by him and associates at and near Joplin, Mo.

The Wentworth Land & Mining Company, Joplin, Mo., has acquired additional mining property and will enlarge the 200-ton mill on the site.

The J. W. Wren Broom Company, Joplin, Mo., has plans for the considerable enlargement of its plant.

The Halsey Automobile Company, St. Louis, will equip a repair shop in connection with the large garage being built for the company and will install several elevators to handle cars.

The city of Golden City, Mo., will equip a water-works plant to cost about \$12,000 under the direction of the mayor.

The Gibson City Creamery Co., Gibson City, Ill., has been incorporated with \$35,000 capital stock by Hans Rasmussen, M. Brittain and R. E. Borchens.

The Dongola Box Company, Dongola, Ill., has been incorporated with \$35,000 capital stock by W. O. Worstman, George A. Malette and C. F. Schluter.

A pumping plant is to be installed by the Henderson County Drainage District, with headquarters at Oquawka, Ill. Bids will be received until September 25 for two centrifugal pumps of 55,000 gal. capacity per minute, with an alternative of electrically driven or steam pumps. The Harman Engineering Company, Peoria, Ill., is in charge.

Fire which wiped out a large portion of Hot Springs, Ark., on September 5 included the electric light and power plant, \$225,000; the Iron Mountain railroad shops, \$25,000; the telephone plant, \$125,000, and a number of other minor plants, all of which will be replaced at once with equipment in most cases larger and better than destroyed.

The Acme Anthracite Company, Russellville, Ark., recently incorporated with a capital stock of \$25,000, is in the market for the necessary equipment for its mine to raise 200 tons daily. B. V. Lewis is president and J. C. Humphrey secretary-manager.

The Bliss-Cook-Oka Company will build a cotton ginny at Blissville, Ark., to be of three 30-saw gin stands, hydraulic press, automatic transfer and electrical operation.

The Scranton Ginning Company, Scranton, Ark., has been incorporated with \$15,000 capital stock, by John H. Raper, Mont Creekmore, and Austin Smith and will equip a ginny at once.

The Farmers' Union Gin & Mill Company, recently incorporated at Vandalia, Ark., by J. C. Hefley and others, will immediately equip a ginny, feed and meal mill. W. H. Wolf is engineer in charge.

The new fertilizer plant at Little Rock of the Arkansas Fertilizer Company will require equipment to cost about \$100,000. It will be electrically operated and will include cranes, bagging and manipulating machinery, etc.

Clinton Willson, Calico Rock, Ark., will rebuild the sawmill recently burned with a loss of about \$10,000.

The Bradley Lumber Company will rebuild its large bandmill at Warren, Ark., which was recently burned. A single bandmill with resaw will be purchased.

The T. S. Grayson Lumber Company, Finns, Ark., has been incorporated with a capital stock of \$50,000 by T. S. and C. J. Grayson and S. A. Doyle and will equip a mill soon.

The Bradley Lumber Company, Warren, Ark., whose mill was burned recently with a loss of \$65,000, will replace the mill and equipment, installing a band and resaw mill with 75,000 ft. daily capacity.

A broom factory is to be equipped at Olyphant, Ark., by E. E. Bricker, of Arthur, Ill.

Fire at Bokhoma, near Idabell, Okla., destroyed the plants of the Wilson Lumber Company, of Dallas, Tex., September 5, with a loss of \$250,000. The mills, it is stated, will be replaced.

The city of Gotebo, Okla., will replace at once the electric light plant recently burned.

The Hennessey Electric Light & Power Company, Hennessey, Okla., will add a 30 to 40-hp. engine, a generator and equipment for a 10-ton ice plant.

The Power, Light & Water Company, Sand Springs, Okla., has plans for the installation of a plant for the production of 1500 hp., including six gas engines and several dynamos.

The city of Tulsa, Okla., has plans for the construction and equipment of a sanitary sewer system under the direction of T. C. Hughes, city engineer, and is in the market for machinery in connection therewith.

The New State Overall & Shirt Mfg. Company, Oklahoma City, Okla., will add a department for the manufacture of knit goods.

Waterworks construction at Cleveland, Okla., is planned under the supervision of the Benham Engineering Company of Oklahoma City, Okla.

W. J. Strange's grain elevator at Chelsea, Okla., burned recently with a loss of \$25,000, will be replaced soon.

The elevator of the Badger-Hudson Company at Fairfax, Okla., recently destroyed by fire, will be replaced, it is announced.

The Leflore Compress & Storage Company, recently reported incorporated with \$75,000 capital stock at Greenwood, Miss., by S. F. Jones, E. R. McShane and others, will install an 80-in. compress to cost about \$23,000.

The Holland Ice Company of Clarksdale, Miss., whose plant was recently burned with a loss on equipment of about \$40,000, will rebuild.

The Federal Fruit & Cold Storage Company, Whitney Central Bank Building, New Orleans, La., will erect a cold storage plant at Macon, Miss., with a capacity and equipment for handling about 30,000 barrels of apples, etc. The capital stock of the company is \$300,000. E. G. Simmons is president.

A five-ton ice plant is planned at Shubuta, Miss., by T. M. Spinks, who is in the market for the equipment. He will also equip an ice cream factory.

The city of Natchez, Miss., will extend its water system and will install an electric pumping station as an auxiliary under the supervision of McCorkle & Baylis, Birmingham, Ala.

The city of Jackson, Miss., will install a filtration plant and is in the market for needed machinery. Massena L. Culley is the engineer in charge of the work. Two pumping stations will be included, involving boiler equipment, pumps, engines, electrical equipment for motor-driven pumps, etc.

The Ebenezer Canning Company, Ebenezer, La., has been incorporated with a capital stock of \$15,000 by J. V. Little, L. S. Sarver and others to equip a cannery.

The Brown Brick Company, Singer, La., has plans for the construction and equipment at De Quincy, La., of a brick plant as well as at Singer. Machinery is being sought for both. J. W. Brown and D. W. Bailey are interested.

The board of commissioners of the Red River and Atchafalaya drainage district, with headquarters at Alexandria, La., is in the market, under the supervision of the board of State engineers at New Orleans, for equipment for a large amount of levee work.

The board of State engineers of Louisiana, New Orleans, will construct 12 miles of road from Mansfield to Benson, La., and is in the market for machinery with which to do the work.

The citizens of Ringgold, La., have organized a stock company for the purpose of putting in waterworks and have also formulated plans for an electric light system.

The Mansfield Hardwood Lumber Company, Shreveport, La., will build an additional sawmill at Winnfield, La. It will have a capacity of 35,000 ft. a day.

Birmingham

BIRMINGHAM, ALA., September 6, 1913.

The general situation in the machinery and machine tool trade continues good, with liberal buying in many lines, boilers and gasoline engines being especially active. Oil mills are resuming and are calling for supplies. The assurance of good crops of corn and cotton has stimulated trade, and country merchants are laying in agricultural implements. A much better business is expected by the middle of the month, when crops will come in freely. Trade shows an improvement over this time last year.

The Alabama Power Company propose to expend about \$100,000 to \$125,000 in the establishment of a substation at Anniston, Ala. Included in the equipment will be three 2000-kva. transformers. Energy will be received from the Jackson Shoals hydroelectric plant, from the Gadsden steam plant and from the hydroelectric plant at lock 12 on the Coosa, reducing the current from 110,000 to 22,000 volts.

A foundry and machine shop, with garage, is to be established at Flomaton, Ala., by G. W. Miller and W. L. Calloway, both of Brewton, Ala.

The Dyas Mill Company, Dyas, Ala., will rebuild a sawmill recently burned.

The Glendon Lumber Company, Glendon, Ala., has been incorporated by P. F. Brady and others and will establish a sawmill.

C. A. Devine, Algonquin, N. Y., proposes to build a factory at Savannah, Ga., for the manufacture of indestructible signs.

Y. W. Williams and N. A. Alexander will establish a plant for the manufacture of handles, wheels and spokes at Dublin, Ga.

The city of Lavonia, Ga., has voted \$15,000 bonds for establishing a waterworks system.

It is reported that the Virginia-Carolina Chemical Company contemplates to establish a fertilizer factory at Jacksonville, Fla. E. M. Whittle, Jacksonville, is district manager.

Texas

AUSTIN, TEXAS, September 6, 1913.

An increase of manufacturing in various lines, particularly in the larger cities of the State, is one of the notable features of the general industrial development. Large amounts of home capital are going into the enterprises. The demand for machinery and tools is good and prospects are favorable for an unusually heavy fall business.

The Texas Light & Power Company is extending its electric power transmission system to cotton gin and a number of other industrial plants in northern Texas.

J. W. Robins, president of the Trinity & Brazos Valley Railroad, announces that the new shops which are to be built for that railroad at Teague will be considerably larger than those recently destroyed by fire. The cost of the shops and equipment will be in excess of \$300,000.

J. H. Fuertes, hydraulic engineer, will prepare plans for the sewage disposal plant to be erected here at a cost of \$550,000. Bonds have been voted.

J. D. Nance, of Dallas, and associates, will install an electric lighting system at Lindale.

The Gamer Crescent Company, Fort Worth, has been organized with \$50,000 capital stock for manufacturing various kinds of machinery. Charles Gamer is interested.

The Stamford Mill & Elevator Company will rebuild its elevator which was recently destroyed by fire at Stamford.

The Fort Worth Pottery Company, Fort Worth, recently organized with a capital stock of \$20,000, will erect a plant for manufacturing pottery. The incorporators are John Scharbauer, B. P. Brummett and G. G. Willingham.

The New Gin Company will erect a cotton gin at Thorndale. M. R. Kennedy is interested.

The Southwestern Campo-Granite Company will erect a stone-dressing plant at El Paso. J. S. Turner is interested.

The Manire Cotton Oil Company will erect an oil mill at Marshall. P. H. Manire is interested.

The Citizens' Ice Company, San Antonio, has increased its capital stock from \$60,000 to \$120,000 for the purpose of enlarging its plant.

The Houston & Texas Central Railroad is constructing new machine shops and a roundhouse at Mexia.

The Huguley Gin Company will erect a cotton gin at Richardson. E. P. Huguley is interested.

The planing mill of Porter Wabley & Company, Cotton Valley, La., which was recently destroyed by fire, will be rebuilt at a cost of about \$50,000.

The Kerens Light & Power Company, Kerens, has been organized for the purpose of building an electric light and power plant. S. E. Bergstrom is interested.

The Pacific Coast

SAN FRANCISCO, CAL., September 3, 1913.

The attention of local machine tool dealers is mainly taken up at present with figuring on the equipment of the navy repair ship Prometheus. Aside from this there is not much inquiry, and no sales of any importance have been closed recently, though some slight improvement is reported in the general run of small single-tool trade. In other lines the situation shows little change. A few large construction contracts are coming out, requiring the purchase of new equipment, but woodworking machinery remains quiet, and many mills in the redwood district are running at half capacity. However, preliminary figures have been taken within the last few months on a number of important projects and there is a very fair prospect of activity after the settlement of tariff and financial questions. The city of San Francisco last week voted \$3,500,000 bonds for municipal railroad construction, and as it is desired to complete the roads in time for the Exposition the work will be rushed as fast as possible. There is some talk of the acquisition by municipalities of public utilities on both sides of the bay, which may cause some curtailment of improvements until the matter reaches a definite issue.

The Moore & Scott Iron Works, of this city, has placed an order for a 32-in. lathe with 26-ft. bed, of American Tool Works make, to be driven by a 20-hp. motor.

T. K. Beard, Modesto, Cal., who has taken the Turlock Irrigation District contract at \$230,330, will use

the work a Marion steam shovel, 40 Koppel square-dump cars of 4-yd. capacity, and three 9 x 14-in. Koppel engines. The Orenstein-Arthur Koppel Company also received from this contractor the order for four miles of new 35-lb. rails, with all joints, spikes, patches and frogs.

The installation of marine engines and hoisting equipment in coastwise lumber carriers has been a matter of more than usual importance this year. One vessel has just arrived for such equipment, and another was launched at Raymond, Wash., this week, and will be towed here shortly. The Globe Milling Company's steamer Portland is to be remodeled at the shipyard, Long Beach, Cal., at a cost of \$40,000, power plant and grain-handling equipment being part of the new outfit.

The city of San Francisco has ordered a five-ton steam roller at a price of \$1897.50.

The McGillivray Construction Company, Sacramento, Cal., street paving contractor, will erect a large street between Tenth and Twelfth streets and B and C streets.

The Craig Shipbuilding Company, Long Beach, has been under consideration for a large addition to its plant.

The Haughy Saw Works, of this city, was damaged by fire to the extent of about \$5000 September 1.

The shop of the Alexander Pipe Company, used for rehauling second-hand pipe, is being moved to the west of the San Francisco Iron & Metal Company, at North Point street near Powell.

The Santa Fe Railway has let a contract for the construction of a concrete roundhouse at Los Angeles and has plans under way for machine and repair shops, power plant, etc., at the same place.

The Midway Gas Company has started construction of a new gas compressor and pumping plant, said to be the largest in the California oil fields, near Marina, Cal. The estimated cost of the plant is about \$100,000. The company plans to pipe natural gas to the Los Angeles district under high pressure. A 15-ton crane has been set up to handle the machinery, foundations for which are now being laid.

Balfour, Guthrie & Co. are preparing to build a plant near Martinez, Cal., for the manufacture of alfalfa products.

The Goleta Bean Growers' Association, Goleta, Cal., is building a large warehouse and will install considerable handling and cleaning machinery.

J. F. Garrett and others are planning to build a large cleaning mill near Biggs, Cal.

The Maier Brewing Company, Los Angeles, has made arrangements to establish a plant at San Diego.

J. W. Davis, Riverbank, Cal., is figuring on the installation of a pressed brick plant.

The Selma Planing Mill Company, Selma, Cal., is preparing to put in some new machines.

The Union Tool Company, Torrance, Cal., has begun erection of another unit to its plant to provide for additional space for its machine shops, which is expected to be in operation within a few weeks. The new building is to be of steel frame with corrugated roof. In addition to oil well pumps and mining tools the company manufactures gasoline and steam station engines and desires catalogues and prices on equipment pertaining to its line. J. J. Bynes is purchasing agent.

The citizens of Kooskia, Idaho, have voted \$10,500 to be used for the construction of waterworks.

The Utah Light & Power Company has under consideration the construction of a transmission line to carry 110,000 volts from a power plant at Grace, Idaho, to Ogden and Salt Lake City.

The City Council of Bandon, Ore., has instructed its city engineer to prepare plans for a municipal water system.

The Booth-Kelly Lumber Company, Eugene, Ore., will erect a concrete fire-proof sawmill at Ringfield to take the place of the one burned in Feb. 1911, with a loss of \$250,000. The new mill will be operated entirely by electricity. The equipment will include, besides electrically-driven saws, electric conveyors and electric locomotives, both of the overhead or monorail and of the ground type. The current required will be purchased from the Oregon Power Company and steam will be purchased from the same company for use in the dry kiln. In return the lumber company will furnish fuel for the Oregon Power Company. The mill will be equipped with an automatic sprinkler system. The capacity of the new mill will be about 30,000,000 ft. per annum. A. C. Dixon is manager.

Eastern Canada

TORONTO, September 6, 1913.

The Canadian Pacific Railway announces that large extensions are to be made on the Angus shops at Montreal, which are to include the erection of two material shops, passenger car shop, freight car shop, bolt and nut shop and extensions to the locomotive shop. Announcement is also made that contracts are to be let for the erection of a \$100,000 car shop at McAdam Junction, N. B.

Bids are being asked for the construction of the new shoe factory which is to be erected on the Western Hill, St. Catharines, Ont., by the Hulbert Shoe Company, of Cortland, N. Y. The building is to be 45 x 100 ft., two stories, and it is expected that it will be ready for operation by December 1.

Fraser's, Ltd., Fredericton, N. B., will erect a saw-mill.

J. A. Marvin, Ltd., will build a biscuit factory at Moncton, N. B.

The C. N. W. Shoe Company, London, Ont., will build a factory in Orillia, Ont.

Richer, Ltd., Montreal, has been incorporated with a capital stock of \$50,000 by J. Richer, J. A. Payette, J. A. Patry and others to manufacture boots and shoes.

The Collene Corset Company, Ltd., London, Ont., has been incorporated with a capital stock of \$50,000 by J. McK. McDermid, D. H. McDermid, W. A. Finch and others to manufacture corsets.

The Manufacturiers de Jonquiere sash and door factory at Jonquiere, Que., was destroyed by fire. The loss is estimated at \$20,000.

The Eastern Car Company, New Glasgow, N. S., has completed its first steel box car. The greater portion of the construction work is finished and cars will be shipped daily from now on.

Announcement has been made that a large company will locate at Sarnia, Ont., to manufacture oil stoves, oil heaters and other oil-burning devices. Last spring, at a meeting of the directors of the Imperial Oil Company, the company was authorized to erect such a plant.

The Metal Extraction, Ltd., has been incorporated with a capital stock of \$100,000 and will build a plant at Montreal.

Puddy Bros., Toronto, are building a \$45,000 addition to their packing plant.

The Dominion Canning Company is rebuilding its factory at St. Catharines, Ont.

West & Jackson, Tillsonburg, Ont., are considering the erection of a sawmill at Englehart, Ont. They wish to receive catalogues of equipment and supplies.

N. Sarrasin & Fils, Montreal, sash and door manufacturers, whose mill was destroyed by fire, will rebuild on the old site. The new structure will cost \$25,000 and will be 80 x 100 ft. A sprinkler system will be installed.

F. Pouliat's sawmill, St. Captan D'Armagh, Que., which was destroyed by fire, will be rebuilt at once.

The planing and lumber mills of Levi M. Bowman, near Heidelberg, eight miles north of Berlin, Ont., were burned with a loss estimated at \$4,000. They will be rebuilt.

The Guelph Brass Foundry Company, Guelph, Ont., recently incorporated by E. L. Tolmie, A. Thompson and H. Haislip, has taken over the plant formerly occupied by the Dominion Axle Works Company and will manufacture brass castings.

Western Canada

WINNIPEG, September 5, 1913.

The demand for various kinds of machinery continues in moderate volume, while the outlook seems to improve as the season advances. Industrial prospects in western Canada are better than at any previous time this season. This is chiefly on account of the more encouraging financial situation and the harvesting of one of the best grain crops in the history of the country. It is predicted that manufacturing will be active next year, and that numerous new plants will be built west of the Great Lakes. Several interesting announcements in this connection have been made this week.

A report from Calgary, Alberta, says that a syndicate of local and Minneapolis capitalists of which O. G. Devonish is the head, will shortly commence the erection in Calgary of one of the largest flour mills in the British Empire. It will be built in four units to cost about \$1,400,000 each, and when they are completed will have a combined capacity of 6000 bbl. per day.

It is reported from Medicine Hat, Alberta, that the

Gilbert Hunt Company, of Walla Walla, Wash., will locate a large plant at the former city to manufacture threshing machines, roller feed mills and other farm machinery. Gilbert Hunt has been in Medicine Hat recently in connection with the proposition.

A by-law has been carried in Souris, Manitoba, authorizing the Town Council to raise \$40,000 for installing a municipal electric light system.

Warren Overpack, Medicine Hat, Alberta, has bought the brick plant of the Purnal Brick Company there, and will install new machinery to increase the capacity to 100,000 bricks per day.

The city of Regina, Sask., is in the market for two centrifugal pumps for the light and power department. The pumps are to operate against a 22-ft. head and to have a capacity of 12,500 gal. per min. E. W. Bull is superintendent.

A. F. McLaren, of the McLaren Cheese Company, Toronto, plans to erect 10 condensed milk factories in British Columbia, the first to be built at Clayburn.

The Western Canada Threshing Machine Company, Ltd., Medicine Hat, Alberta, is negotiating for the erection of a large plant for the manufacture of farm implements. J. E. Davies, Medicine Hat, is the president of the company.

W. G. Downing & Co., Regina, Sask., contemplates building a boot and shoe factory to cost about \$15,000. Storey & Van Egmond are the architects.

Edward Webster, of the firm of Burke & Webster, millers of St. Peter, Minn., is in western Canada looking over available locations for a flour mill. If a suitable location is found his company will move to this side of the line.

The plan of the Amalgamated Engineering Company for North Vancouver has been approved by the Minister of Public Works for the erection of the largest shipbuilding drydock and ship repairing plant in Canada, to cost \$4,000,000. Work will start as soon as the necessary formalities are arranged. Four building berths will be erected, of which two will be 100 ft. x 750 ft., and two will be 75 ft. x 350 ft. C. V. J. Spratt, Victoria, B. C., is managing director of the company, which includes Col. Sir Henry Pellatt, Col. Sir John M. Gibson, D. B. Hanna and E. J. Palmer.

Davidson & Smith will build a flour mill and elevator at Port Arthur, Ont.

Hedley Shaw, managing director of the Maple Leaf Milling Company, Ltd., announced that the company proposed building a large flour mill at Medicine Hat, Alberta, next spring. The site has already been acquired.

The Fort William Brass Foundry, which was recently destroyed by fire, has been reorganized under the name of Varlow Foundry Company, Ltd.

The Hardstone Brick Company, Edmonton, Alberta, is installing additional machinery, so as to give the plant a daily capacity of 60,000 bricks.

The British-American Paint Company, Victoria, B. C., is erecting a branch factory at Edmonton, Alberta, to cost \$20,000.

Kasimir Kocot has purchased the brewery at Regina, Sask., and intends to spend \$135,000 on improvements and additions.

The Crystal Ice Company, Calgary, is planning to erect an ice plant to cost \$200,000.

The Tribune Publishing Company, Winnipeg, Man., is building a \$173,000 addition to its publishing plant.

The City Council of Calgary and the United Farmers are considering the erection of a packing plant at Calgary, Alberta.

The Empire Lumber Company has commenced active operations in the development of its timber holdings in the Cowichan Lake district on Vancouver Island. The company will erect a large sawmill at Crofton, B. C.

Government Purchases

WASHINGTON, D. C., December 4, 1913.

Bids will be received until September 30 by the Bureau of Supplies and Accounts, Navy Department, Washington, under Schedule 5829, for a vertical milling machine for Washington, and until October 7, under Schedule 5831, for a vertical, steam-driven, double-acting simplex pump for Puget Sound; under Schedule 5847, for an electrically-driven portable deck winch complete for Brooklyn; under Schedule 5848, for furnishing and erecting a three-ton, two-motor electric traveling crane for Brooklyn.

Bids will be received by the Bureau of Yards and Docks, Navy Department, Washington, until October 18, for an ice plant for Pearl Harbor.

Bids will be received at the office of the purchasing

officer of the Isthmian Canal Commission, Washington, until September 17, under circular 793, class 12, for riveting forges, and until October 6 for boilers, rollers, centrifugal pumps, turbines and a coal conveyor, their installation and piping systems, etc., for the hospital at Newport. Estimated cost, \$40,000.

The following bid was received by the purchasing agent, District Government, Washington, D. C., August 28, for furnishing one rotary two-ring vacuum pump—May-Nelson Rotary Pump Company, \$150.

Bids were received at the bureau of supplies and accounts, Navy Department, Washington, September 1, for supplies for the navy yards as follows:

SCHEDULE 5700—Steam Engineering

Class 2, Mare Island—One boring and turning mill, 30 in.—16, \$3479.90 and \$4085.40; 101, \$1799; 119, \$1824, \$1890 and \$2131, \$2195; 141, \$3509 and \$4113; 149, \$1662 and \$1525.

Class 2, Alternate—f.o.b. works—Bid 16, \$3117.40 and \$3672.10; 1575; 119, \$1628, \$1694, and \$1834; 131, \$1895; 141, \$1844 and \$3713.

Class 3, Mare Island—One boring and turning mill, 24 in.—16, \$2797.20 and \$2983.45; 141, \$2864 and \$3064; 174, \$1524.

Class 3, Alternate—f.o.b. works—Bid 16, \$2509.45 and \$2804.14; \$2594 and \$2769; 174, \$1398.

Class 4, Mare Island—One surface planer grinder—Bid 1300, \$1335, and \$1367; 141, \$700.

Class 4, Alternate—f.o.b. works—Bid 119, \$1130, \$1161 and \$1195; 141, \$625.

Class 5, Mare Island—One motor-driven emery grinder—Bid 136 and \$152; 50, \$132; 72, \$332.89; 101, \$206 and \$385.89; 181; 141, \$175; 149, \$315 and \$285; 189, \$135.

Class 5, Alternate—f.o.b. works—Bid 19, \$131 and \$146; 122.50; 72, \$323.20; 101, \$180 and \$534; 119, \$159; 141, \$165; 170; 189, \$118.40.

Class 6, Mare Island—One hydraulic pipe-bending machine—149, \$466 and \$615; 174, \$298.90.

Class 6, Alternate—f.o.b. works—Bid 42, \$310; 101, \$442; \$444 and \$588; 174, \$290.90.

Class 7, Mare Island—One slip roll forming machine—Bid 200; 101, \$186.50; 102, \$181; 119, \$238; 122, \$210; 141, \$149, \$298.

Class 7, Alternate—f.o.b. works—Bid 18, \$170; 101, \$140; 102, \$147.40; 119, \$172; 122, \$200; 141, \$185; 149, \$246.

Class 8, Mare Island—One hydraulic test pump—Bid 12, \$850; informal; 65, \$1300; 149, \$535.

Class 8, Alternate—f.o.b. works—Bid 12, \$800; 21, informal; 101, \$645.50; 148, \$3117.30; 149, \$500.

Class 9, Mare Island—One hand-power portable shears—\$59; 19, \$104; 65, \$50.70; 119, \$58; 141, \$190.

Class 9, Alternate—f.o.b. works—Bid 18, \$47; 19, \$90; 65, \$119, \$45, 141, \$175.

Class 10, Mare Island—One motor-driven grindstone—Bid \$413; 119, \$540 and \$572; 134, \$320 and \$425.

Class 10, Alternate—f.o.b. works—Bid 4, \$398; 95, \$140; \$503 and \$535; 134, \$278 and \$387.

Class 11, Mare Island—One scroll saw—Bid 4, \$462 and \$472, \$532.68 and \$497, alt.; 95, \$180, alt.; 65, \$613 and \$539 alt.; \$359; \$400, \$235, and \$280; 119, \$335 alt., \$380 alt., \$213 alt., \$258 alt.

Class 12, Mare Island—One universal bench saw—Bid 4, \$72, \$725.74; 65, \$827.50 and \$674.75; 109, \$445; 119, \$610, \$570, and \$730.

Class 12, Alternate—f.o.b. works—Bid 4, \$940; 72, \$694; \$737.50 and \$599.75; 109, \$429; 119, \$560, \$738, \$533, and \$134, \$566.

Class 13, Mare Island—One boring and mortising machine—4, \$810; 72, \$646.78; 65, \$688.50; 119, \$562 and \$665.

Class 13, Alternate—f.o.b. works—Bid 4, \$780; 72, \$607; \$300; 65, \$610; 119, \$515 and \$620.

Class 14, Mare Island—One core box machine—Bid 72, \$775; 65, \$759; 134, \$577.

Class 14, Alternate—f.o.b. works—Bid 72, \$753.85; 65, \$134, \$514.

Class 15, Mare Island—One hand saw—Bid 4, \$515; 72, \$640 and \$523.08; 65, \$610; 119, \$420, \$455, \$300, and \$360; 134, \$479.

Class 15, Alternate—f.o.b. works—Bid 4, \$500; 72, \$607.12; \$494.33; 95, \$225; 65, \$534; 119, \$363.

Schedule 5729—Steam Engineering—Class 40, Philadelphia—Two pneumatic jarring molding machines—Bid 90, \$1225; 121, \$720 and \$880.

Schedule 5730—Steam Engineering—Class 41, Brooklyn—Turbine rotor drums for battleship No. 1—Bid 12, \$169,568; 123, \$160,272; 138, \$57,436 and alternate units.

Schedule 5738—Steam Engineering—Class 61, Philadelphia—One universal tool-grinding machine—82, \$650; 154, \$1500.

Following is a list of bidders whose numbers found with the bids given above:

4. The American Woodworking Machinery Company.
12. Bethlehem Steel Company.
16. The Bullard Machine Tool Works.
18. Bertsch & Co.
19. Berger & Carter Company.
21. The Blake & Knowles Steam Pump Works.
42. Camden Iron Works.
50. Cincinnati Electrical Tool Company.
55. James Clark, Jr., Electric Company.
65. Charles F. Elms Engineering Works.
72. J. A. Fay & Egan Company.
95. Hall & Brown Woodworking Machine Company.
101. Kemp Machinery Company.
102. Knox & Brother.
109. B. G. Luther & Co.
119. Manning, Maxwell & Moore.
122. John A. Miller Company.
131. Niles-Bement-Pond Company.
134. Oliver Machinery Company.
141. Pacific Tool & Supply Company.
148. Rumsey & Co., Ltd.
149. Rix Compressed Air & Drill Company.
174. Universal Trading Company.
176. United States Electrical Tool Company.
189. The Hisey-Wolf Machine Company.

